A Substance Abuse Indicator Chart Book for North Dakota

Second Edition

Prepared for the
State of North Dakota
Department of Human Services
Division of Mental Health and Substance Abuse Services

By

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EXECUTIVE SUMMARY

This Chart Book describes the results of an analysis of substance abuse indicators to determine how North Dakota compares to other states and how North Dakota's counties and regions compare to one another. The analysis is important because substance abuse and the substance abuse treatment system are partially statewide in scope and partially unique to each of North Dakota's communities. The Chart Book presents the study's results in a relatively nontechnical format meant to be accessible to citizens, local officials, and other interested parties.

The study employed existing substance abuse indicator data available from state and national sources. The investigators obtained interstate data for 1997 to 1999 and county-level data for North Dakota from 1991 to 2001. The primary county variables included eight years of mortality data, six years of arrest data, three years of hospital reimbursement claims data, and eleven years of treatment client data. After reviewing each data set for indications of clerical, coding, or programming errors, the study team extracted relevant information, created a series of count and rate variables at the county and regional levels, and combined them in a data base. Published research and statistical analyses of the reliability and validity of the indicators established their relevance for the study.

To summarize these data at the interstate and regional levels, the study team created composite indexes of alcohol and drug indicators: The Drug Need Index (DNI), the Alcohol Need Index (ANI), and the Substance Abuse Need Index (SNI). The interstate ANI included alcohol mortality and alcohol-defined arrest rates (driving under the influence and liquor law violation arrests). The regional ANI, which measured geographic differences in the level of alcohol problems within the state, used liquor law violations and disorderly conduct as the alcohol arrest measures and included alcohol hospital claims data along with alcohol mortality data. The interstate DNI included drug mortality and drug possession and sale arrest rates. The regional DNI included drug hospital claims along with drug sale and possession arrests and drug mortality data. The interstate SNI included unduplicated alcohol and drug mortality rates and combined alcohol- and drug-defined arrest rates that were employed in the ANI and DNI. The regional SNI used the arrest, mortality, and hospital claims data used in the regional ANI and DNI with mortalities attributable to both alcohol and drug use counted only once.

The Chart Book presents the study's results in a series of charts and maps of the need indexes, their components and other relevant measures. The maps described the distribution of drug and alcohol problems throughout North Dakota. The charts focused on state, regional, and county differences in the number of cases, rates per 100,000, and index scores. Appropriate caution should be employed to avoid over-interpretation of the county rates, especially with regard to mortality statistics. Many of North Dakota's counties have relatively small populations. In counties with small populations, infrequently occurring events such as alcohol- and drug-related deaths can produce average rates for multiple years that are poor estimates of the long-term substance abuse treatment needs in the area. Consequently, the county mortality charts include both the mean rates for eight years and the number of deaths during the eight years. Readers should view high rates in small areas with appropriate caution and place greater reliance

on the composite indexes, the actual number of events (e.g., deaths) that produced the rates, and the consistency of rates among contiguous areas. Also, these findings should be viewed in the context of the results of the other members of North Dakota's family of needs assessment studies.

The study found that counties and regions varied substantially with regard to the rates of drug and alcohol abuse problems. The findings confirmed that alcohol problems are the State's major substance abuse problem. Alcohol rates were often highest in small rural counties, while drug abuse rates were highest in large urban areas. There were also exceptions to each of these general trends. The exceptions were often in small areas, and their high rates may be reflections of random statistical variations rather than alarming indications of severe problems. Confirmation from other sources should always be sought for any finding based on a relatively small number of indicators over a relatively brief period of time.

Between 1993 and 2001, the alcohol treatment client rate was up in North Dakota, whereas between 1995 and 1997 alcohol hospital claims remained steady. The alcohol arrest rate rose steadily between 1994 and 1999, and the alcohol mortality rate in North Dakota rose steadily from 1993 through 1997 before dropping by almost two-thirds between 1997 and 1998. The alcohol mortality rate rose again after 1998, but remained lower than the peak of 17 per 100,000 people in the population during 1997. The Alcohol Need Index (ANI) indicated the Lake region (Regional Human Service Center [RHSC] III) had the most severe alcohol problems in North Dakota. In particular, Rolette and Benson Counties in that region had high rates of alcohol hospital claims and alcohol morality. The Lake region area has a high poverty rate and a high concentration of American Indians. The Northwest region (RHSC I) also had a high ANI score.

Progress was made in the measurement of drug problems in this study. In the first edition of this social indicator study, the authors did not construct a DNI to complement the ANI because there was insufficient data to obtain sufficient reliability for the potential indicators, and therefore construction of a valid DNI was unlikely. For this study, the authors reassessed the possibility of constructing a DNI. The reliability of the drug indicators (mortality and arrests only because there were no additional years of hospital discharge data available) improved at the regional level, which was the level relevant to the indexing process. When the authors examined how the indicators performed in a model of substance abuse, the results led the authors to conclude that development of a valid DNI was now possible for North Dakota. The analysis showed that drug arrests correlated highly with drug treatment clients while drug mortality correlated with drug hospital claims, but not with arrests or treatment clients. The authors considered this information in light of the fact that North Dakota has the highest percentage of clients in treatment for marijuana in the nation (see the "Interstate Comparisons" chapter of *An Integrated Substance Abuse Treatment Needs Assessment for North Dakota* [2002]) and that the majority of North Dakota's drug arrests are for marijuana sales and possession. The authors postulated that drug arrests and drug mortality are unrelated phenomena in North Dakota and therefore should not be expected to correlate. The majority of drug arrests and drug treatments are due to marijuana use, while most drug deaths and hospitalizations are due to use of hardcore drugs including cocaine, heroin, and methamphetamine.

Between 1993 and 2001, drug arrests, hospital claims, treatment client rates, and drug

mortality rates were up in North Dakota. The state's 2000 drug mortality rate was more than ten times the 1993 rate. The drug arrest rate nearly doubled between 1994 and 1999. Although North Dakota's drug abuse problem still ranks the lowest among states in the country, these trends should be watched carefully.

Regression analysis that used the total substance abuse treatment rate as the dependent variable and substance abuse treatment need (SNI) as the independent variable found a high correspondence between the treatment needs and services in the state's regions. Almost 70% of variance in treatment rates across the eight regional human service regions in North Dakota was explained by differences in need across regions. Differences between the observed substance abuse treatment rates and the rates predicted by the need index indicated some regions have less treatment than warranted by their levels of need given the treatment rate in the state as a whole. In particular, the Southeast region had a sizable gap in services. The state may wish to target that area for additional services in the future.

INTRODUCTION

This Chart Book describes the results of a study of how North Dakota compares to other states and how North Dakota's counties and regions compared to each other regarding major substance abuse indicators. The analyses focus on learning which counties and regions have the greatest relative need for substance abuse treatment services.

The Family of Studies

This investigation is part of the North Dakota family of treatment needs assessment studies. With funding and technical support from the Center for Substance Abuse Treatment (CSAT), the State has undertaken a family of studies to assess the extent of its substance abuse problems and to plan the State's response to them. The family of studies seeks to assess the State's treatment service needs, identify gaps in service, and make recommendations for the future resource allocations and modifications of the treatment system's design. The studies include a statewide telephone household survey of adults and a survey of American Indians on reservations. The current analysis is an updated version of a previous social indicator study prepared for North Dakota by the North Charles Research and Planning Group.

Role in the Family of Studies. The indicator analysis plays a special role in the family of studies. The study takes a comparative perspective, whereas the other studies in the family of studies focus on the absolute level of the State's treatment service needs and its response to them. The analysis is important because substance abuse and the substance abuse treatment system are partially statewide in scope and partially unique to each county and region. Each region's response to its mix of substance abuse problems depends partly on its own history, population, and policies. The region's response also depends on clinical developments, regulations, and funding available for substance abuse services from a range of sources, including state and federal programs. By examining how a region differs from its counterparts regarding both its substance abuse problems and treatment services, the study will help reveal the region's need for substance abuse services.

Readers should bear in mind that a county or region's relative status may say surprisingly little about the absolute severity of its substance abuse problems or the area's absolute success in meeting its substance abuse service goals. Previous needs assessment studies have shown that even states which have provided relatively high levels of treatment services compared to other states may nevertheless have a substantial amount of unmet demand for services. The overall problem index was the result of combining a relatively severe alcohol problem and a relatively less severe drug problem. Most of the drug-related problems were associated with marijuana.

METHODS

Data Sources

This study employs existing substance abuse indicator data that the study team gathered from state and national sources. Before using them, the analysts examined each data set for the presence of outliers and other sources of error. An example of an outlier would be an annual count that is many times higher (lower) than the previous (subsequent) year for the county, especially when the annual change is not consistent with the usual annual variations in the data for that county and other counties. In such cases, the study team alerted State officials who contacted the responsible state or local officials about the outlying values. If corrected values or comparable figures were available, the authors used them. As a general protection against undetected or uncorrected random errors, the study combined multiple years of data to obtain more reliable composite indicators.

Indicators varied with regard to the number of years that were available for analysis. The study used available data between 1991 and 2001. Drug and alcohol arrest statistics covered the period from 1994-1999, while county-level treatment client data covered 1991 to 2001. The mortality data covered the period 1993 to 2000. The rates are average annual ("mean") rates per 100,000 residents. The denominators for each annual rate were state population projections for the relevant years.

Measurements and Index Construction

To summarize the information from multiple indicators, the authors created composite indexes of controlled drug and alcohol treatment needs at the interstate and regional levels: The Drug Need Index (DNI), the Alcohol Need Index (ANI), and the Substance Abuse Need Index (SNI). The interstate composite indexes include measures of alcohol- and drug-related rates of deaths and arrests. The regional Alcohol Need Index, Drug Need Index, and Substance Need Index each also included hospital reimbursement claims per 100,000.

The Drug Need Index included drug mortality, drug arrests (sales and possession), and drug hospital discharges. The drug mortality indicator counted only deaths with codes that explicitly mentioned drugs of abuse as one of the causes listed on the death certificate. The diagnostic codes included accidental drug overdoses, drug dependence, nondependent drug abuse, and drug psychoses (including drug withdrawal syndrome). The drug-related hospital claims measure used a similar set of explicit-mention diagnoses. The drug arrest statistics included possession and sale/manufacturing arrests for controlled drugs. The study used a drug-related contagious disease index that included acute hepatitis B and C, early syphilis, tuberculosis, gonorrhea, and chlamydia. The analysts selected these indicators for study because they were linked theoretically to drug abuse, had been empirically validated in the literature, and were available at the county level.

The regional ANI included average annual rates of alcohol mortality, alcohol-defined arrests, and alcohol hospital claims. The alcohol mortality measure employed 12 explicit-mention diagnoses widely employed as a measure of alcoholism. Examples were alcohol dependence, non-dependent alcohol abuse, alcohol psychoses, alcoholic cirrhosis of the liver, and alcohol cardiomyopathy. The hospital claims measures used a similar set of diagnostic codes that explicitly mentioned alcohol. Up until 1998, the mortality and hospital claims data were coded using the conventions of the 9th revision of the International Classification of Diseases (ICD-9). Data after 1998 were coded using the new codes in the 10th revision (ICD-10). The new coding affected only the mortality data because there were no additional years of hospital claims data added after 1997. The alcohol-defined arrest measure included liquor law violations and disorderly-conduct arrests. The primary purpose of the indexes is to assess a state or region's drug and alcohol treatment needs.

An index score of 100 equals the combined highest observed mortality, arrest, and hospital claims rates during the study period. A scale score of zero indicates that there was no evidence of treatment need, as shown by there being no deaths, arrests, or hospital claims in the region or state during the study period.

Analysis and Presentation

When describing these indicators, the report focuses on the comparative nature of the analysis by reporting the county or region's average annual rate per 100,000 and in some cases, its rank in the State or the State's rank in the country. In all cases, the county or state with the most severe drug or alcohol abuse problem is ranked 1st, and the county or state with the least severe problem is ranked 53rd or 50th respectively. The analysis begins with the alcohol indicators and then turns to the controlled drug indicators. In the presentation of results for each substance, the report begins with the composite index, and then it describes the components of the index and other supplementary indicators. The charts describe the State's ranking in the country and then describe the counties or regions within the State.

The Chart Book seeks to make the results of the indicator analyses accessible to local officials and citizens, state officials, and other interested individuals. By use of maps and charts, the authors sought to minimize the technical requirements for understanding and utilizing the analyses. The bar charts present the index scores, counts, or rates per 100,000, and in some cases, the county or state rankings.

Readers should exercise substantial caution when interpreting the results for individual indicators, especially the mortality, contagious disease, and the traffic fatality rates. Many of the counties are relatively small. As a result, even rates based on four or five years of data can be volatile. Some of the very high or very low rates may be poor estimates of long-term treatment needs in the area. For those variables, the charts include the actual number of cases that occurred during the study period. The treatment indexes are based on several indicators and are therefore more reliable predictors of long-term need. Also, the maps provide a context for interpreting the rates. When there are clusters of small areas with similar rates, it is likely that the rates are more

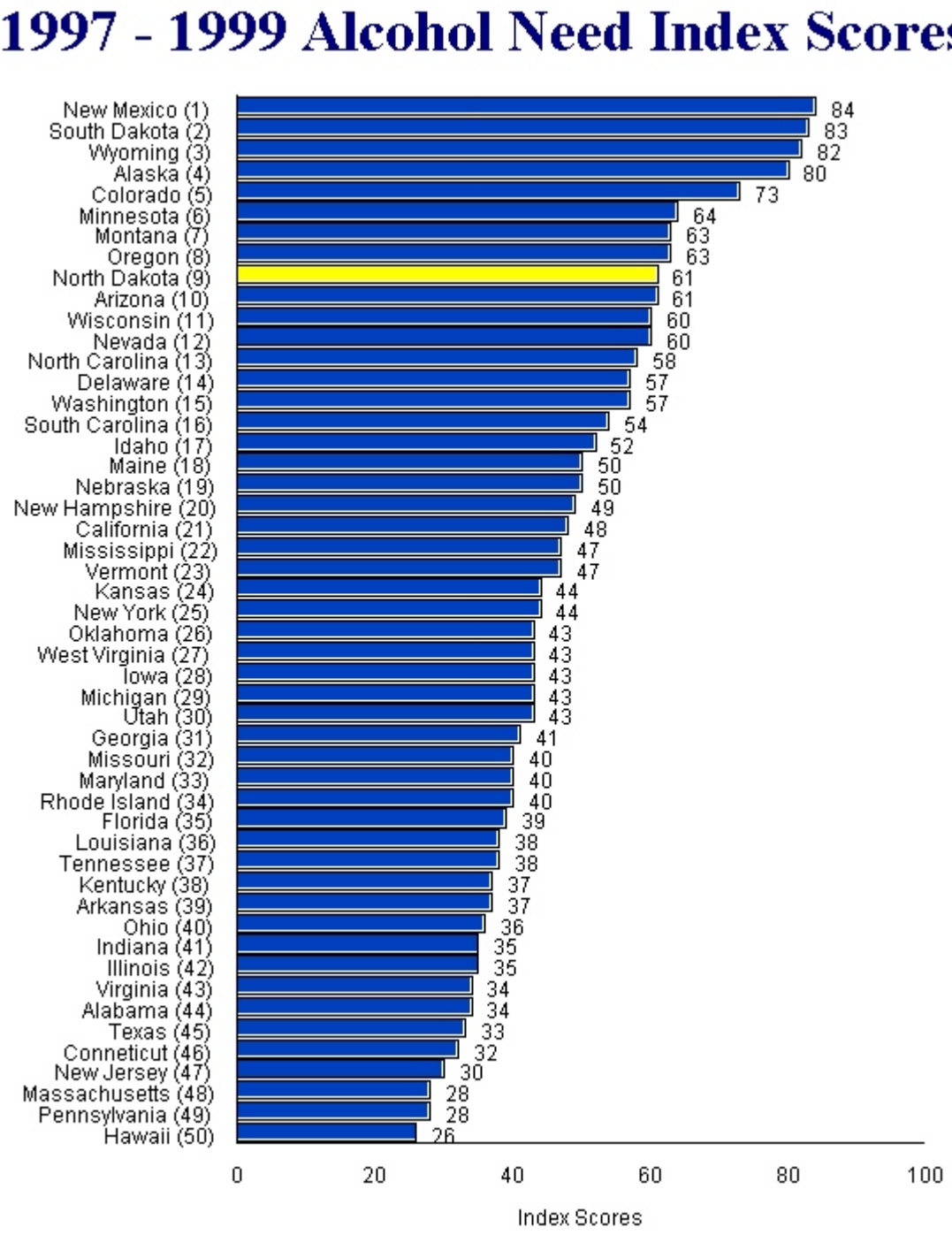
stable estimates. Confirmation from other sources should always be sought for any finding based on a relatively small number of indicators over a relatively brief period of time.

Regions Used in Analysis

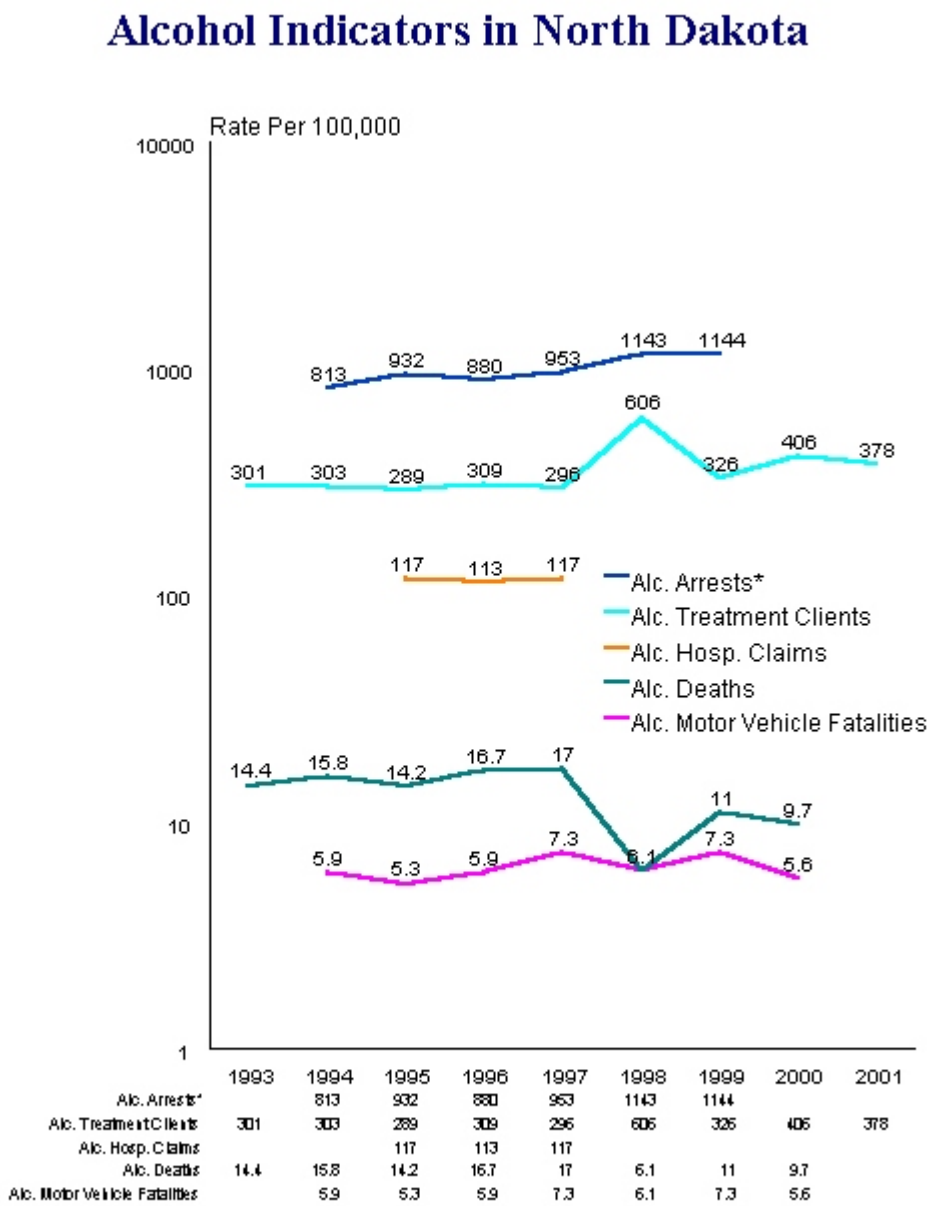
Regions	Human Service Center	Counties In Region
I	Northwest	Williams, Divide, McKenzie
II	North Central	Ward, Burke, Mountrail, Renville, Bottineau, McHenry, Pierce
III	Lake Region	Ramsey, Rolette, Towner, Cavalier, Benson, Eddy
IV	Northeast	Grand Forks, Pembina, Walsh, Nelson
V	Southeast	Cass, Steele, Traill, Ransom, Richland, Sargent
VI	South Central	Stutsman, Wells, Foster, Griggs, Barnes, Logan, LaMoure, McIntosh, Dickey
VII	West Central	Burleigh, McLean, Mercer, Sheridan, Oliver, Morton, Kidder, Grant, Sioux, Emmons
VIII	Badlands	Stark, Dunn, Billings, Golden Valley, Slope, Hettinger, Bowman, Adams

ALCOHOL INDICATORS

Alcohol Problems Compared to Other States

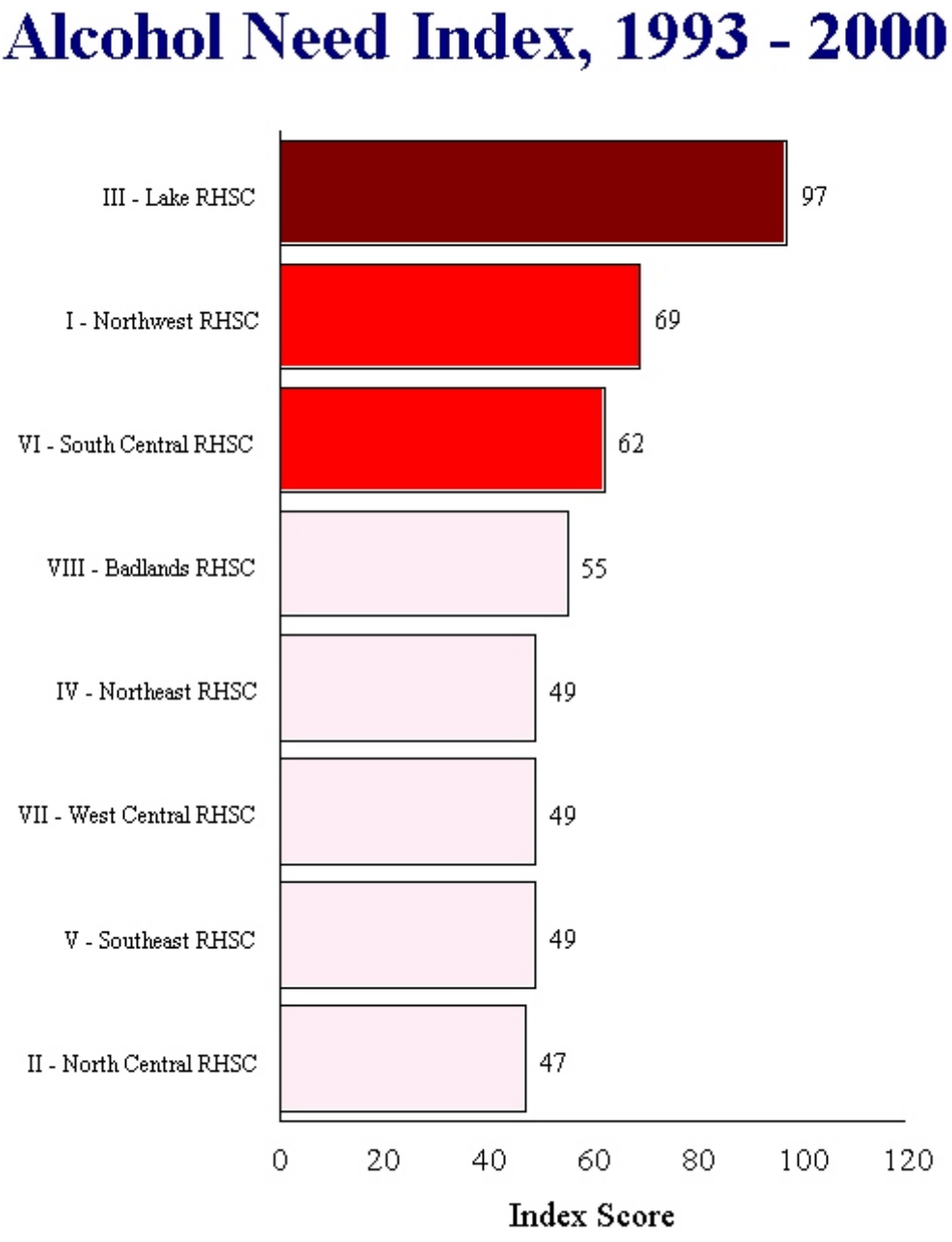


Alcohol Indicators in North Dakota



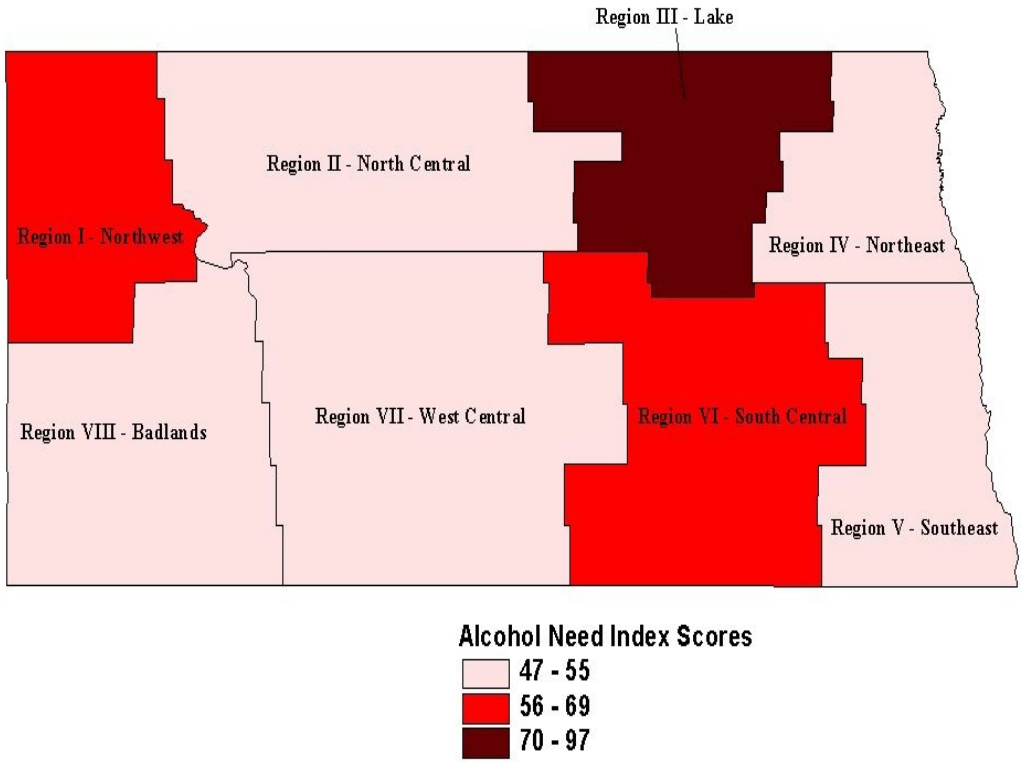
*Liquor law violations and disorderly conduct

Alcohol Treatment Need Index

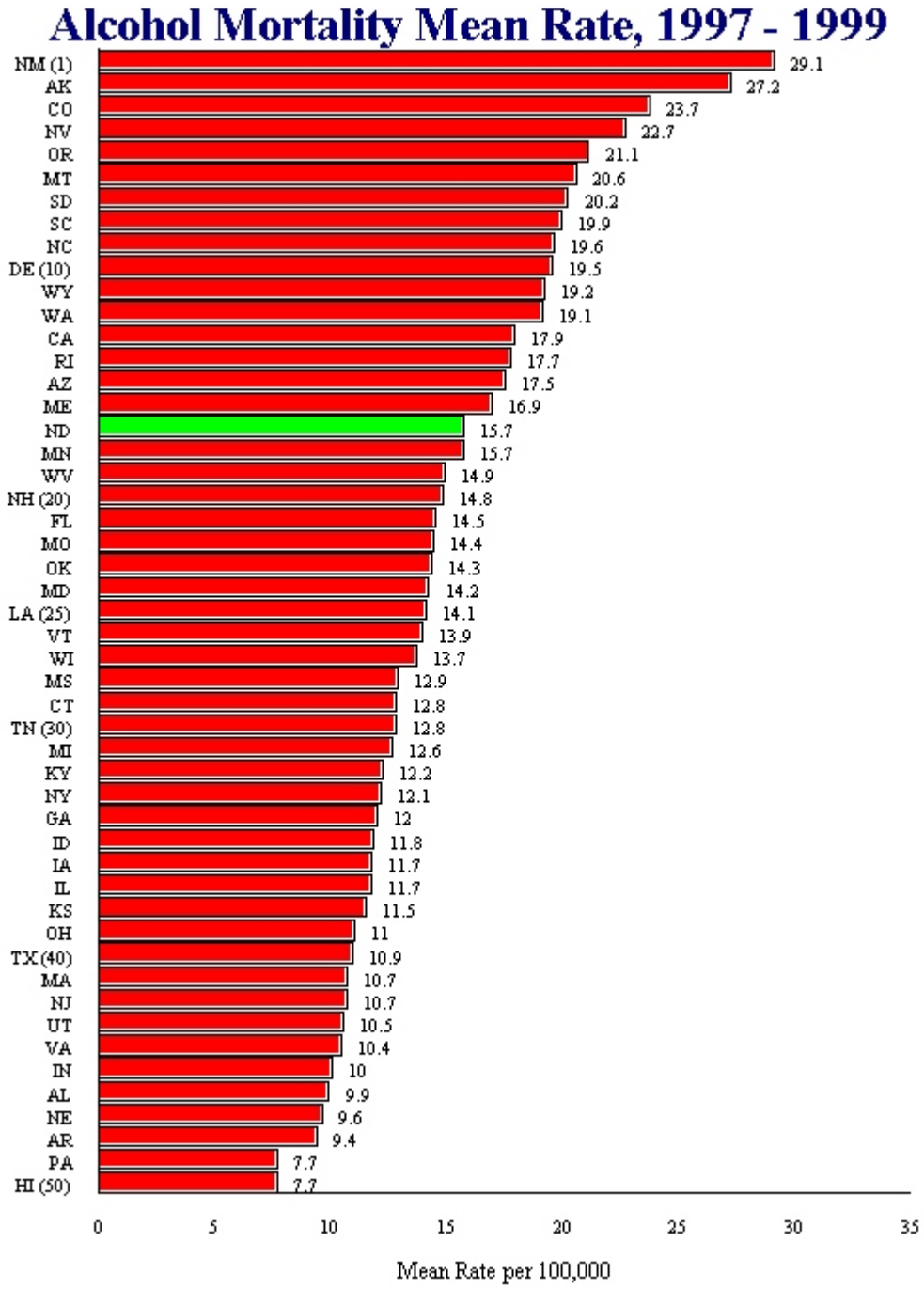


Alcohol Treatment Need Index

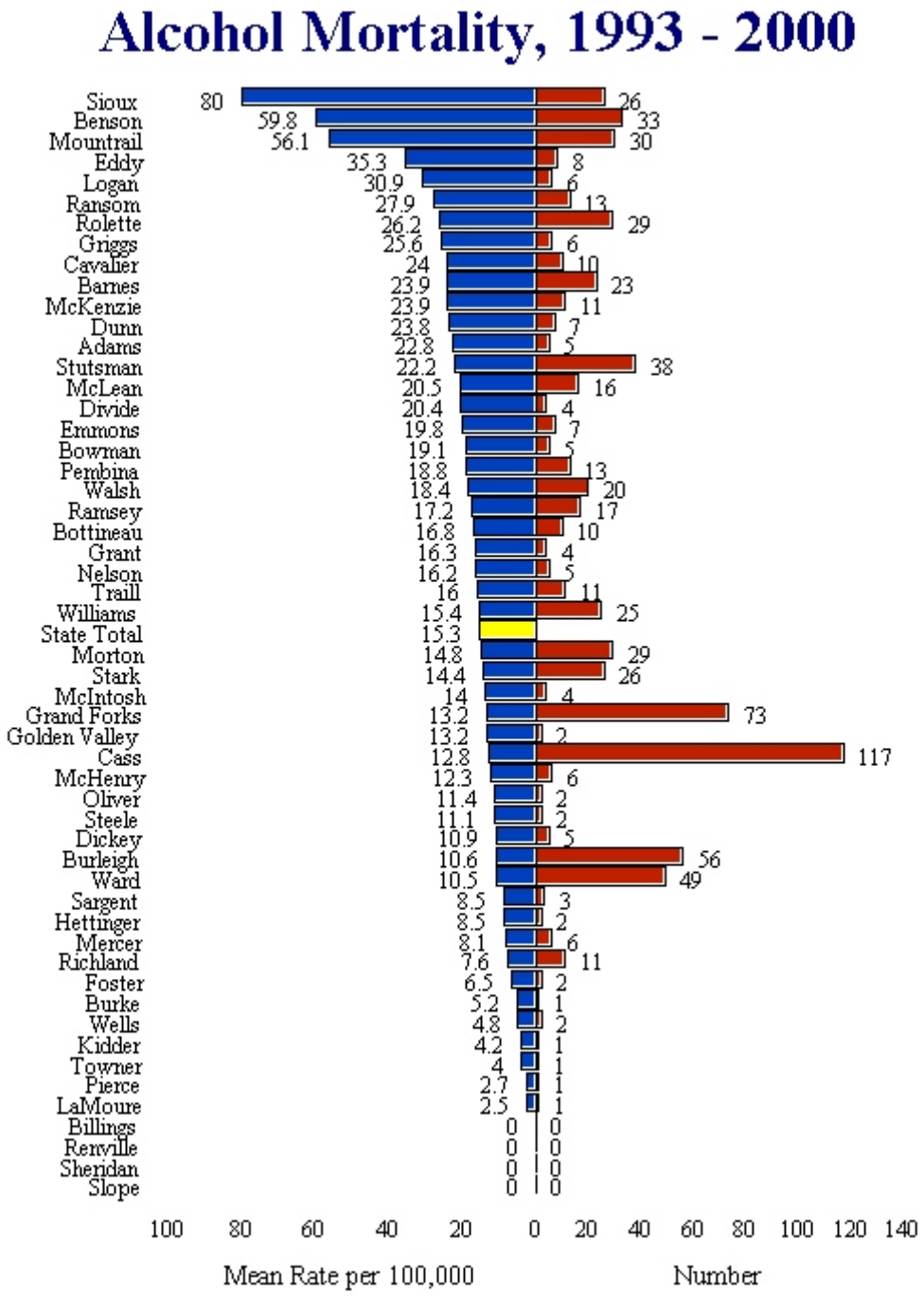
Alcohol Need Index



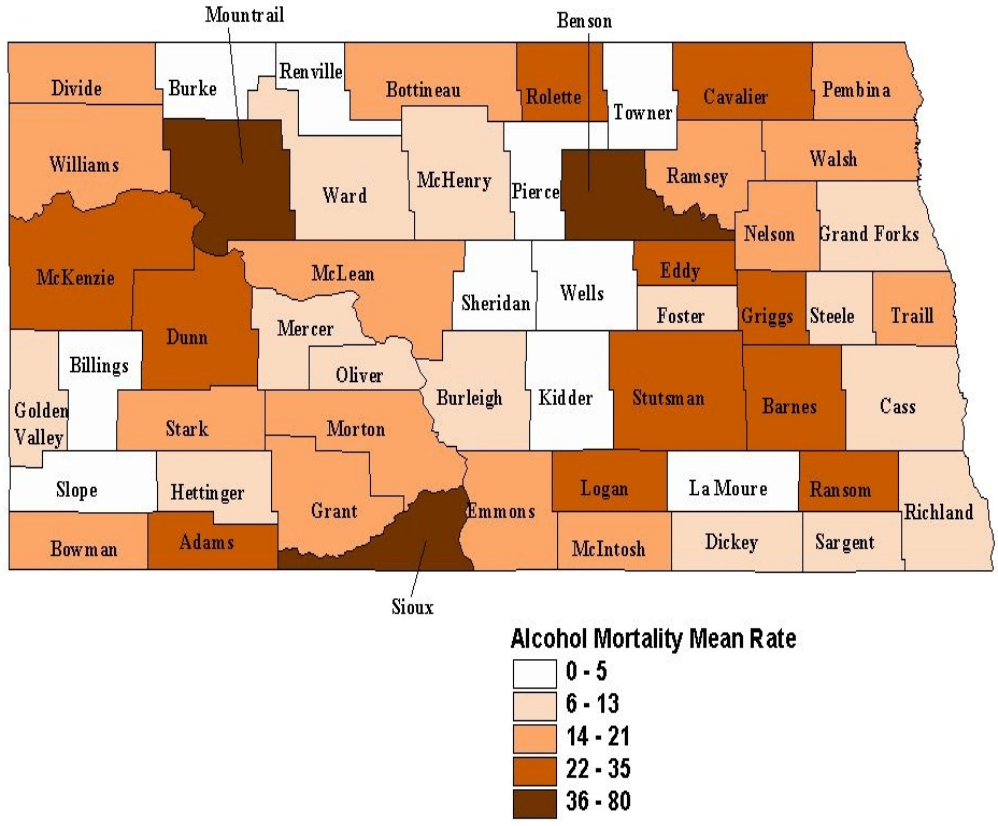
Alcohol Mortality



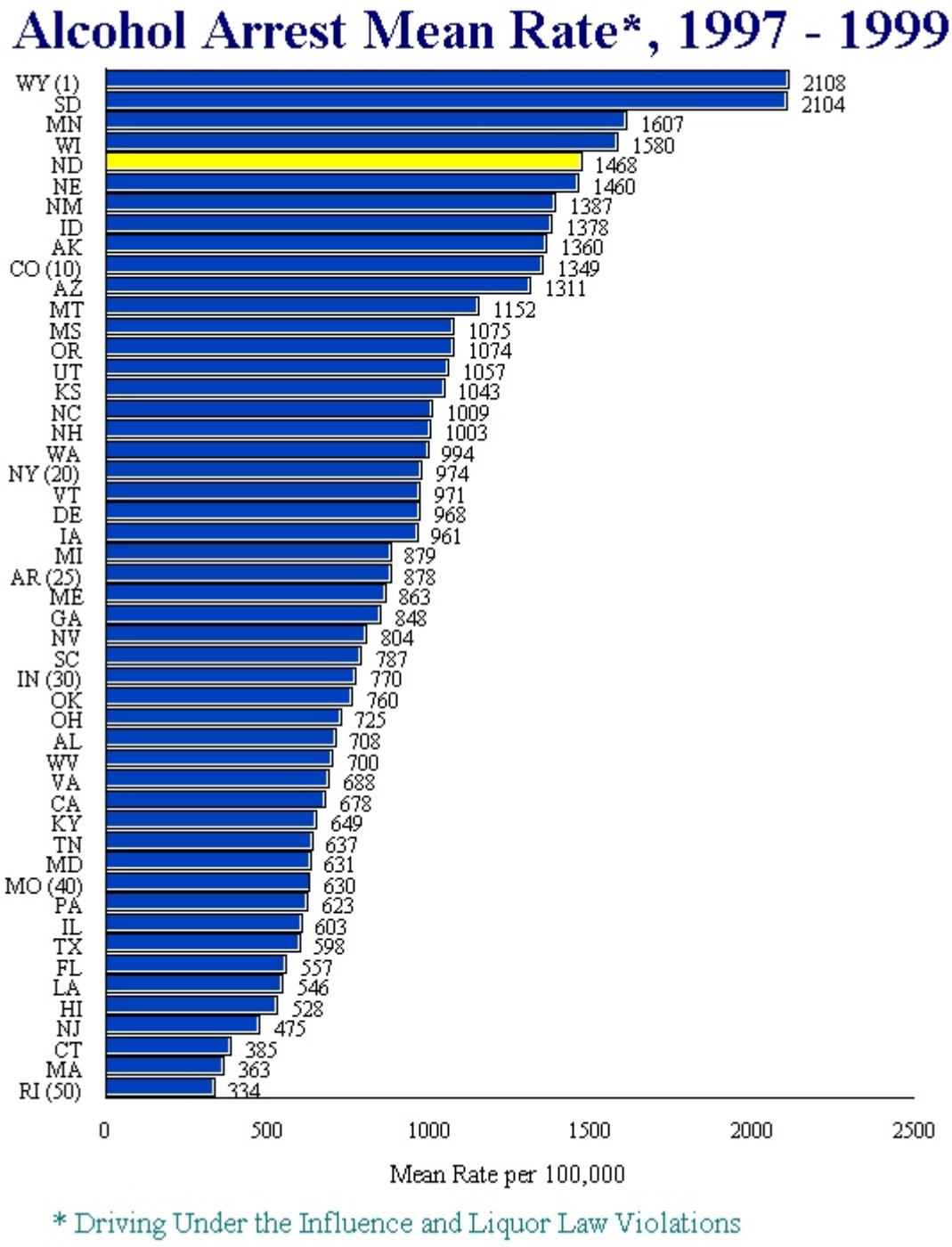
Alcohol Mortality



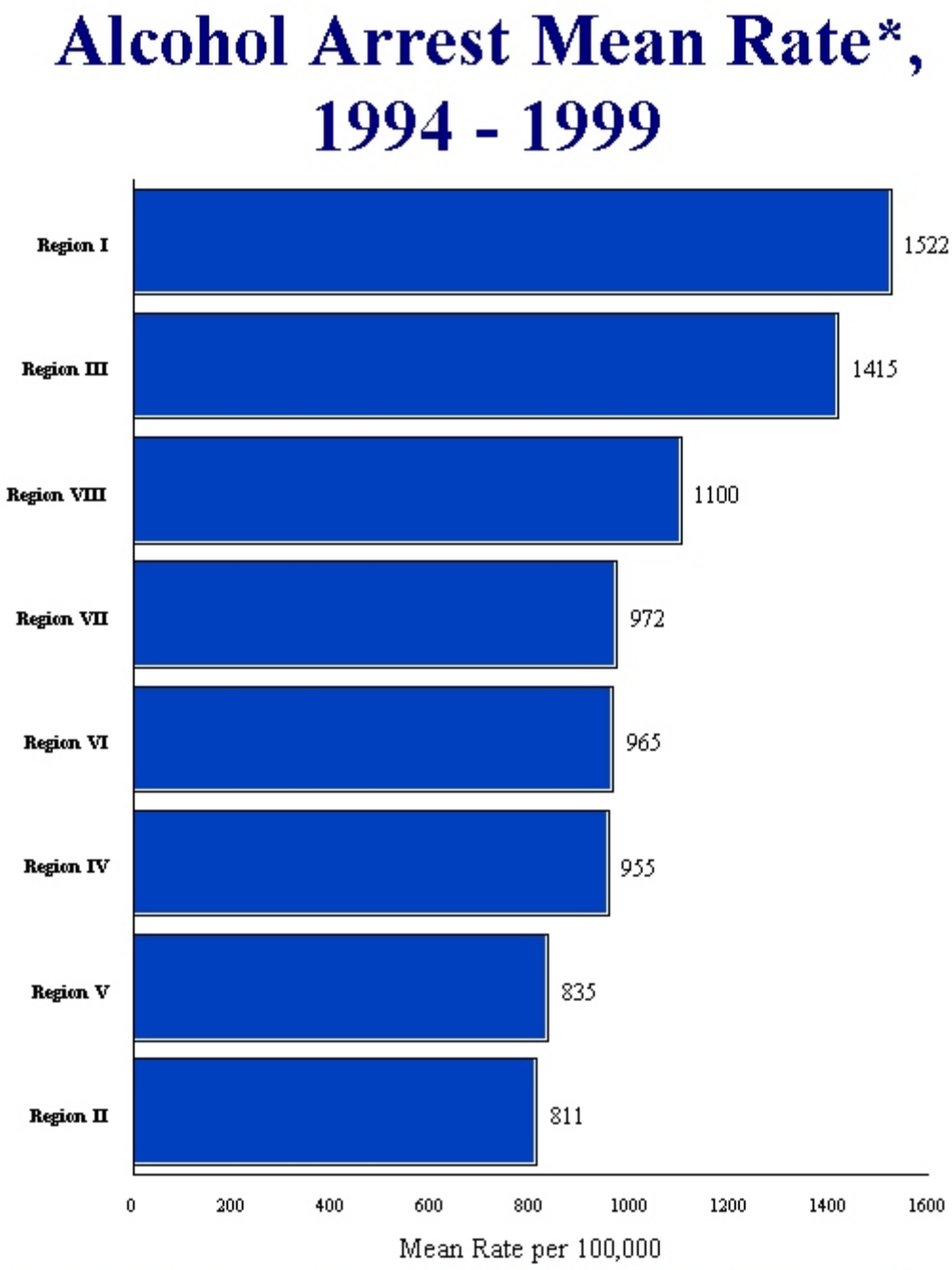
Alcohol Mortality Mean Rate, 1993 - 2000



Alcohol Arrests: Driving Under the Influence and Liquor Law Violations



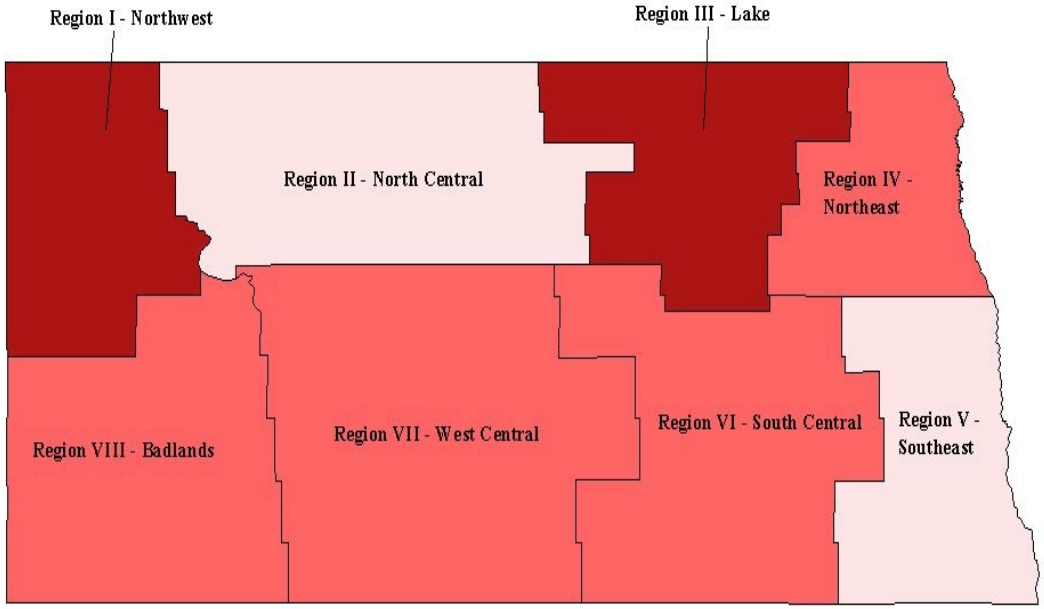
Alcohol Arrests: Disorderly Conduct and Liquor Law Violations



* Includes disorderly conduct and liquor law violations, the ANI arrest components.

Alcohol Arrests: Disorderly Conduct and Liquor Law Violations

Alcohol Arrest Mean Rate*, 1994 - 1999



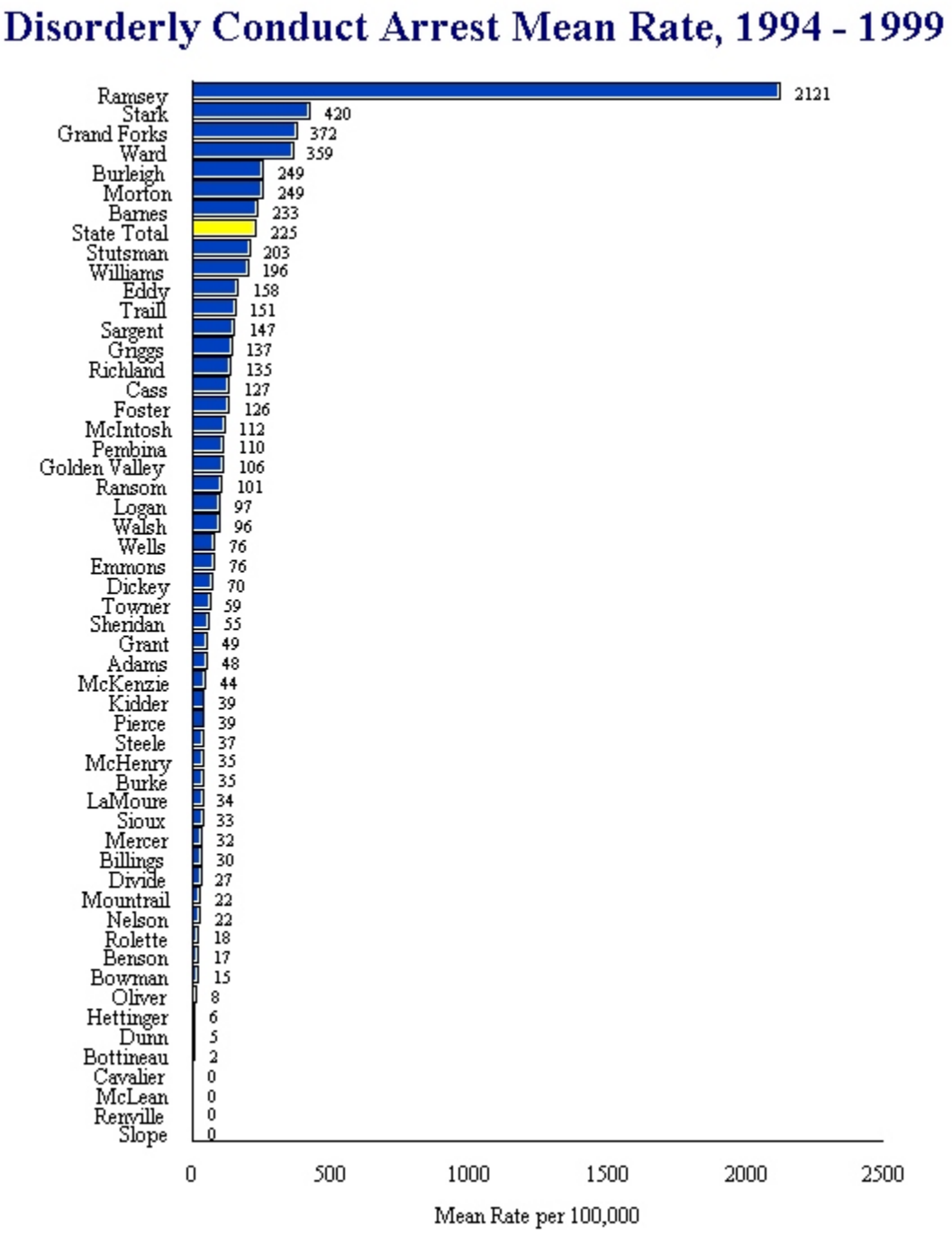
* Includes disorderly conduct and liquor law violation arrests, the ANI arrest components.

Alcohol Arrest Index Component Mean Rates

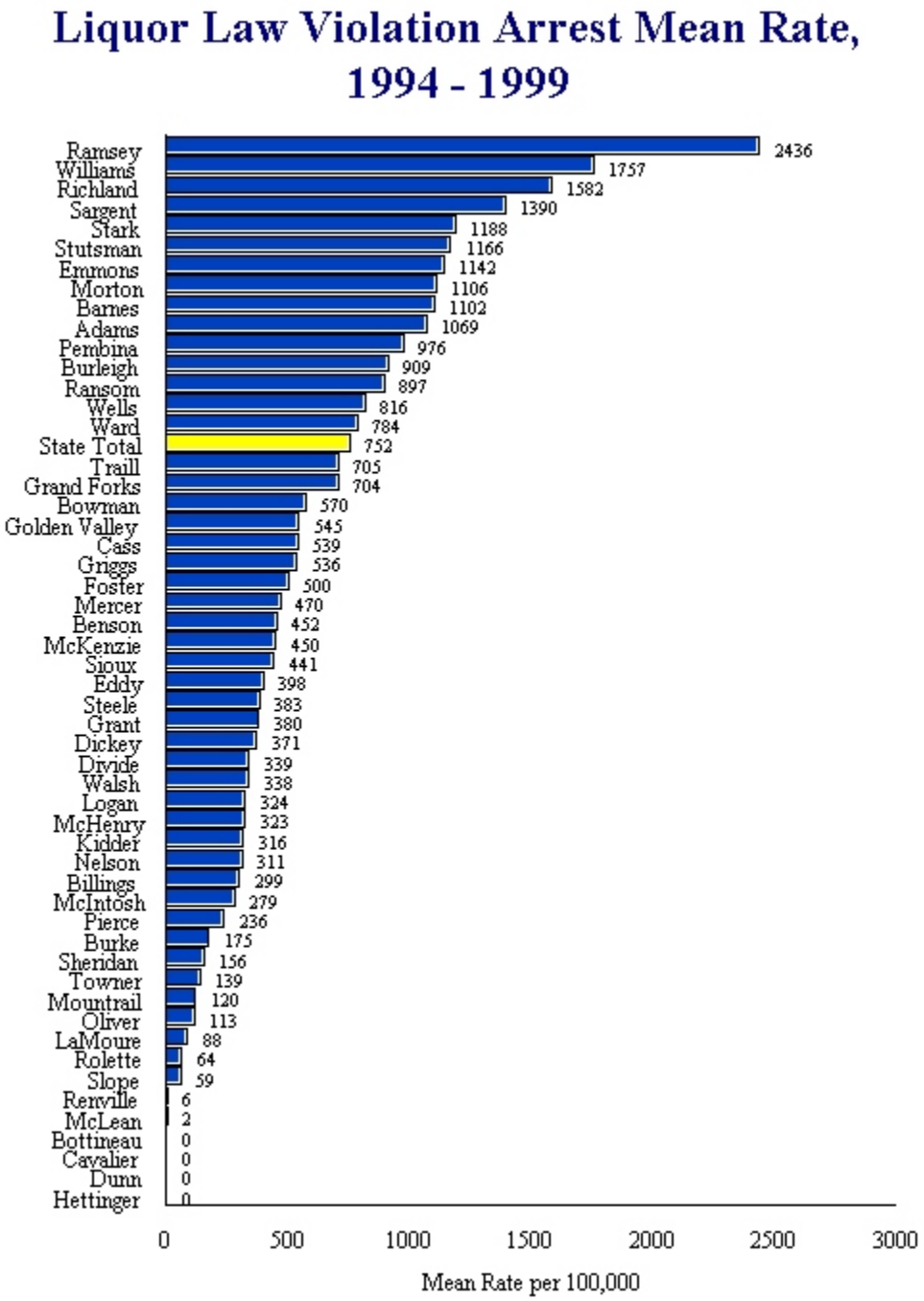
- 811 - 835
- 836 - 1101
- 1102 - 1522

Alcohol Arrests

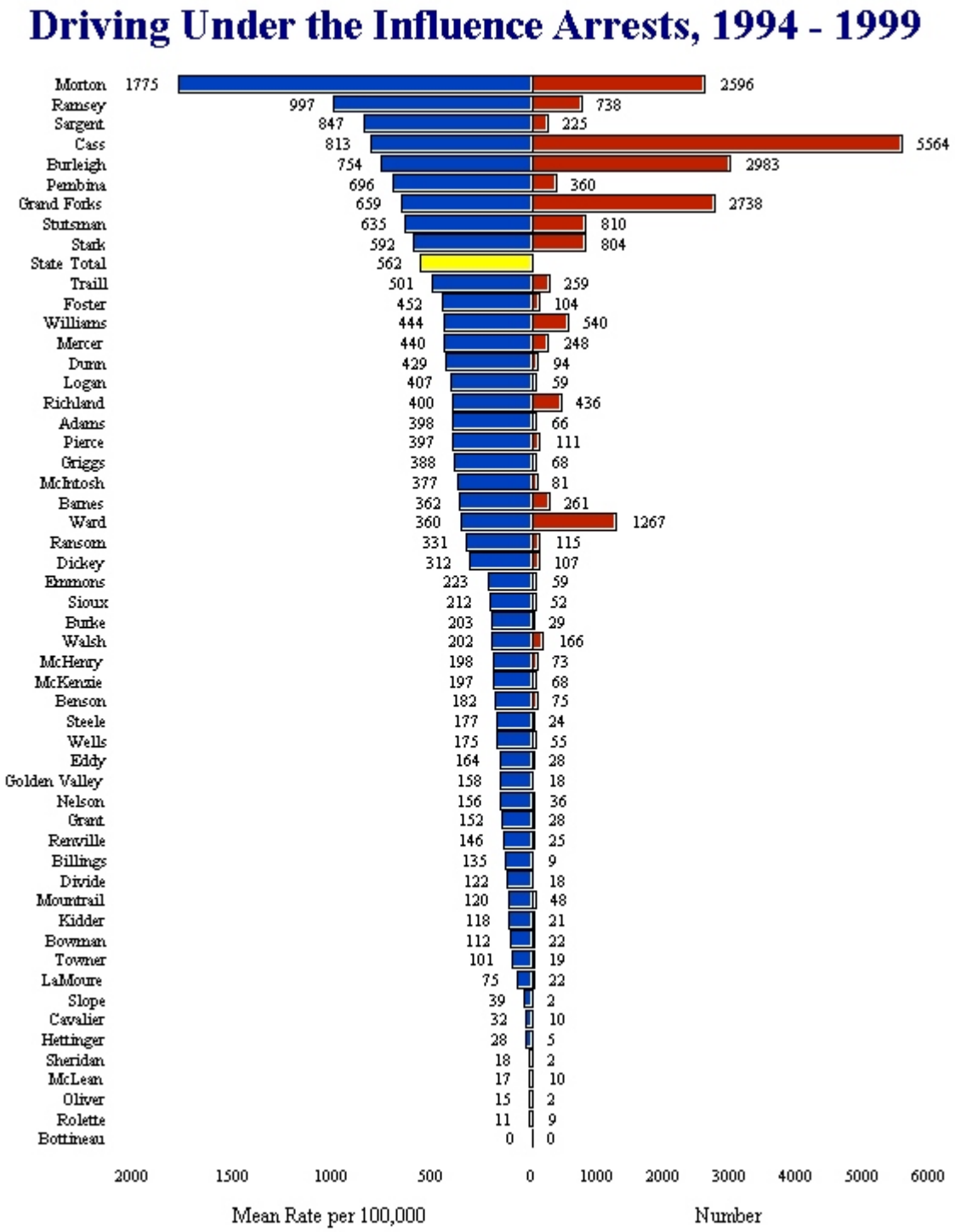
Disorderly Conduct



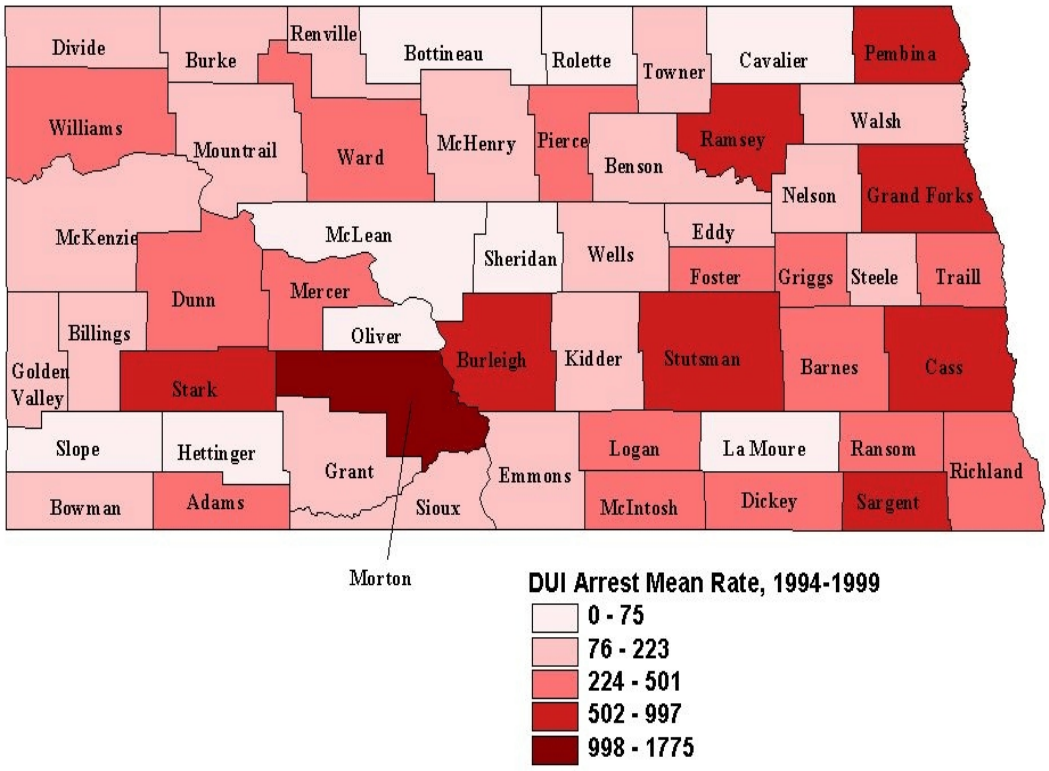
Liquor Law Violations



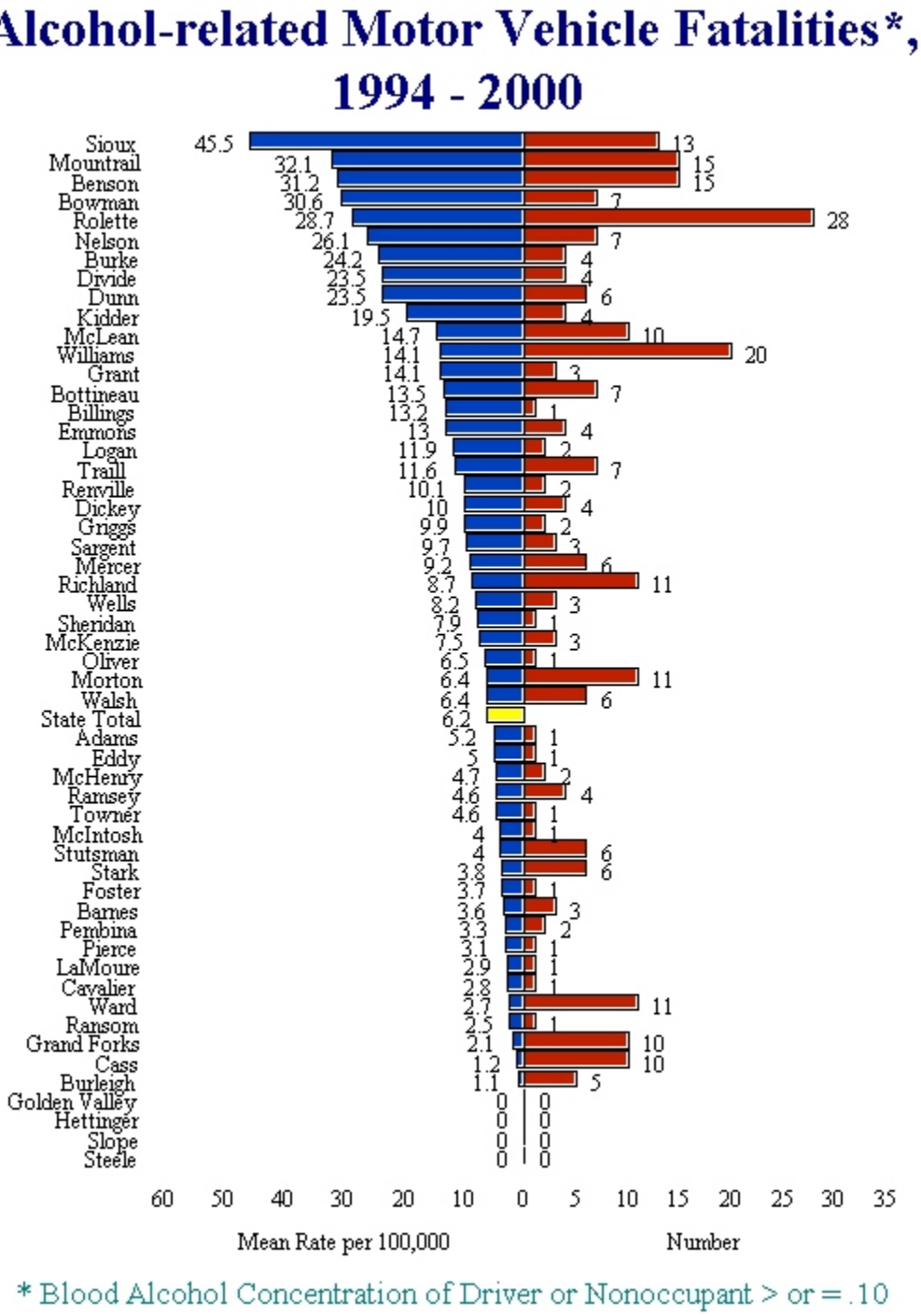
Driving Under the Influence



Driving Under the Influence Arrest Mean Rate, 1994 -1999

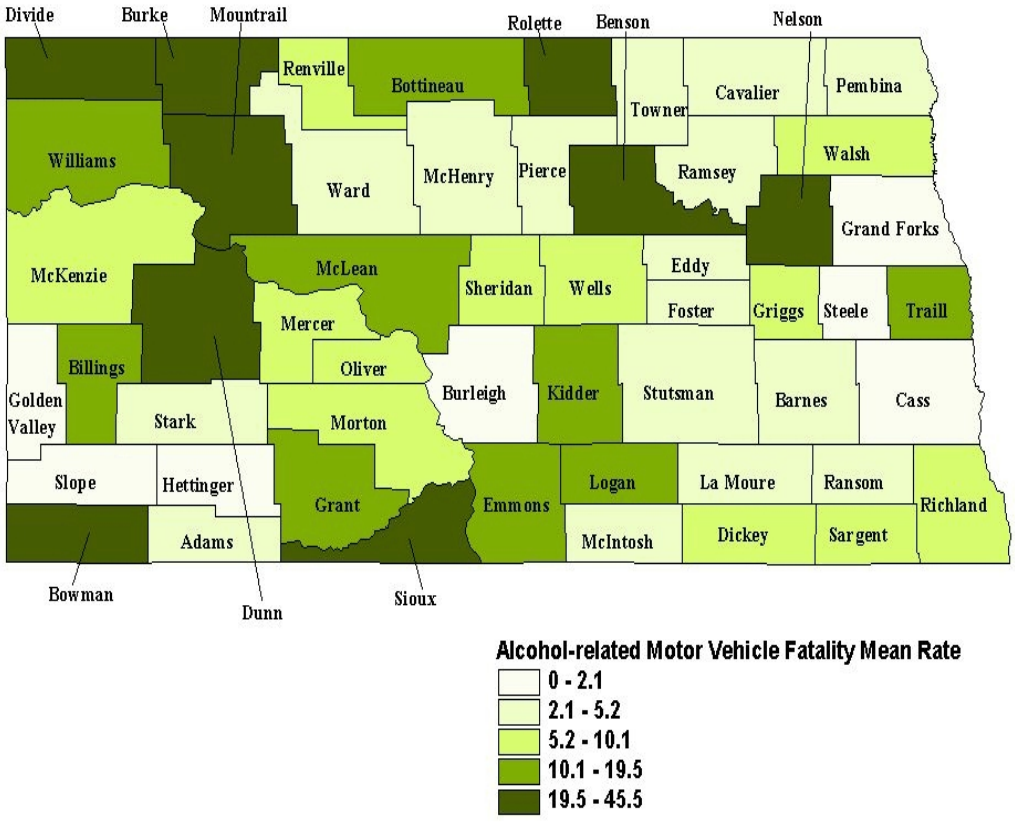


Alcohol-related Motor Vehicle Fatalities

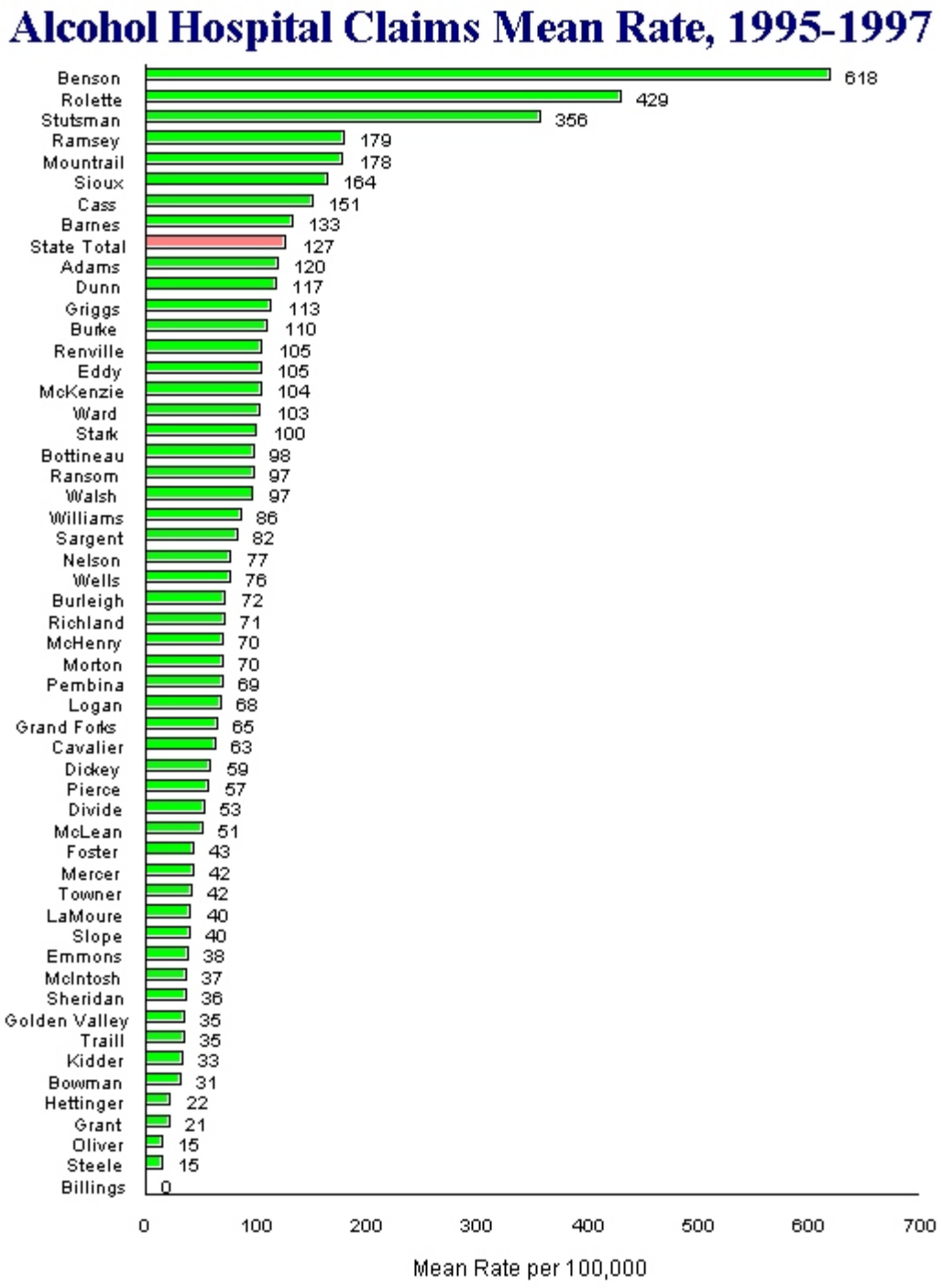


Alcohol-related Motor Vehicle Fatalities

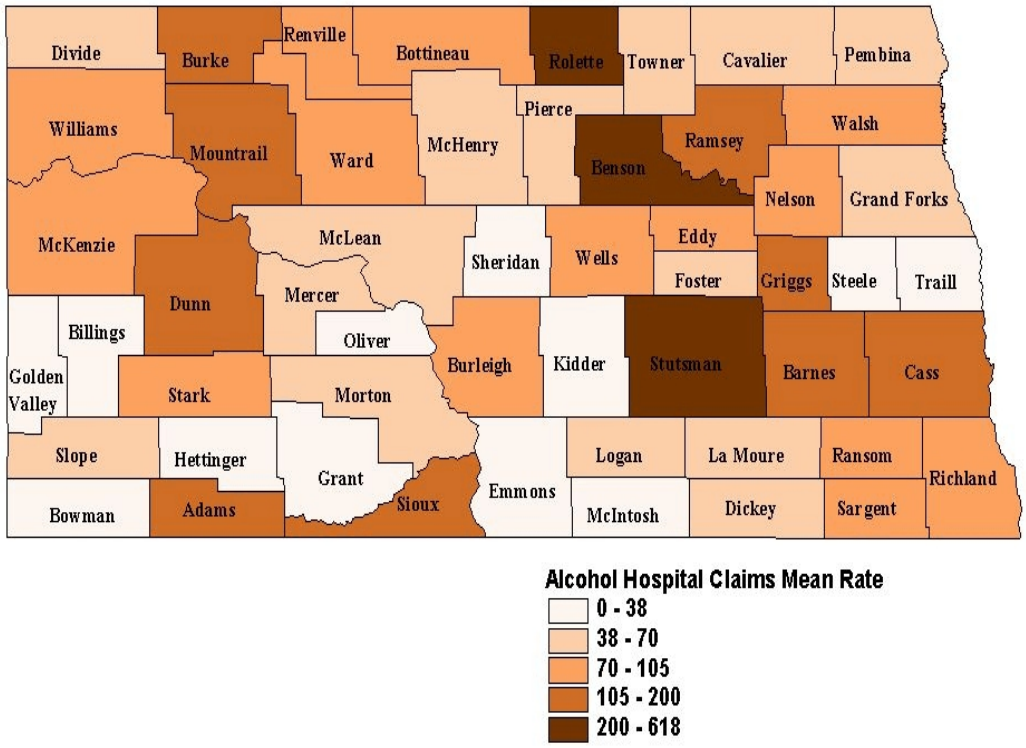
Alcohol-related Motor Vehicle Fatality Mean Rate, 1994 - 2000



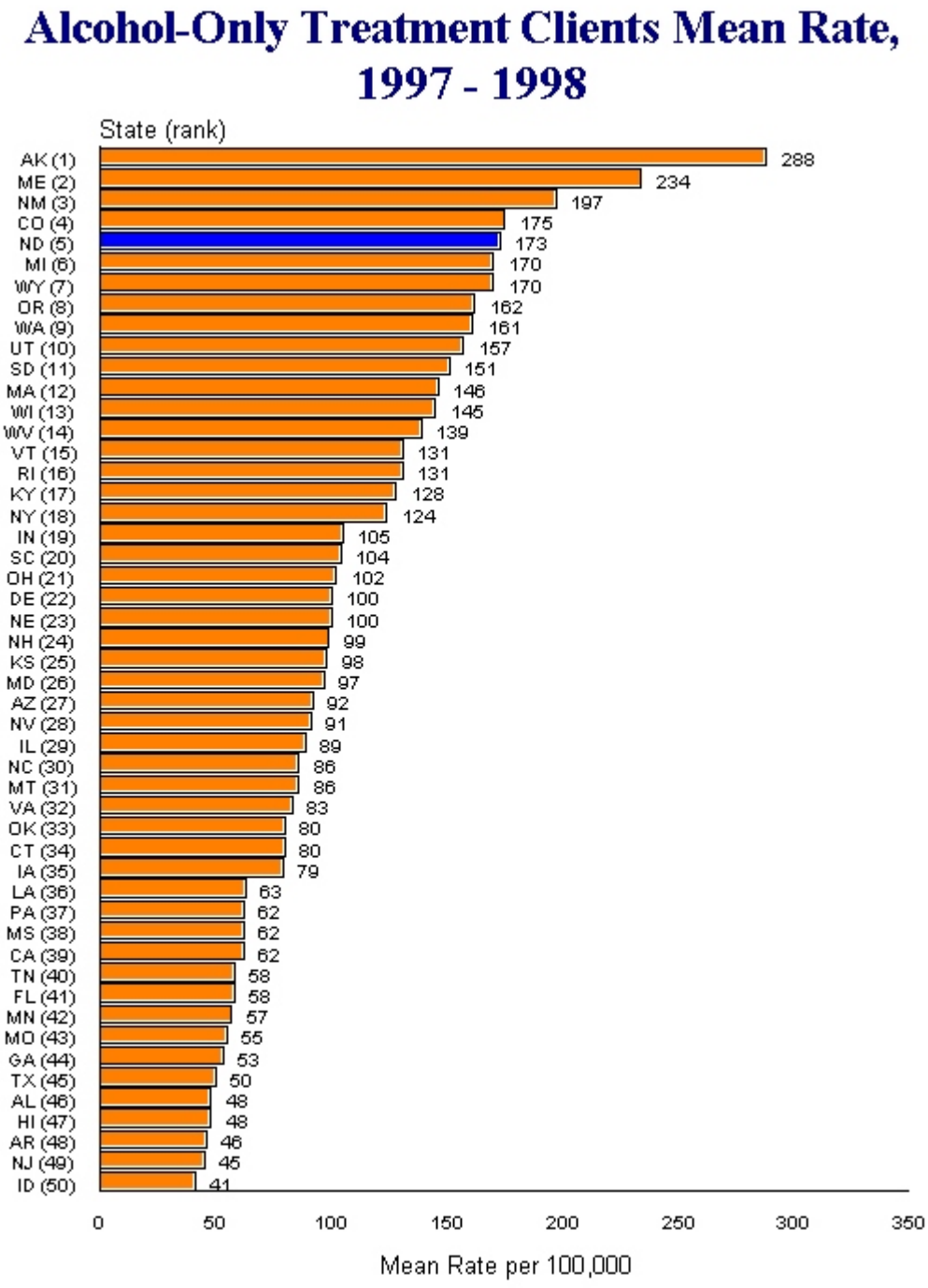
Alcohol Hospital Claims



Alcohol Hospital Claims Mean Rate, 1995 -1997

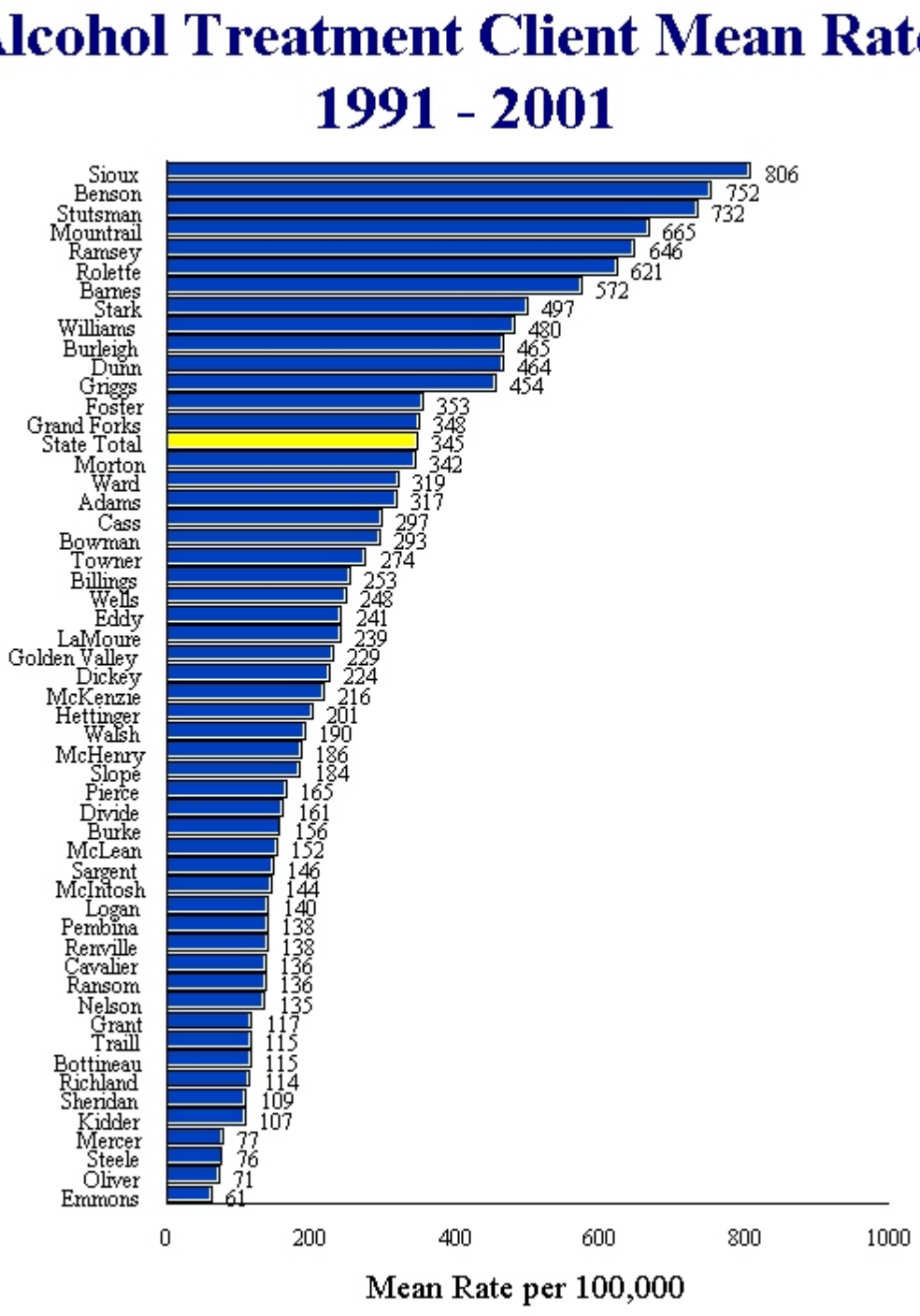


Alcohol Treatment

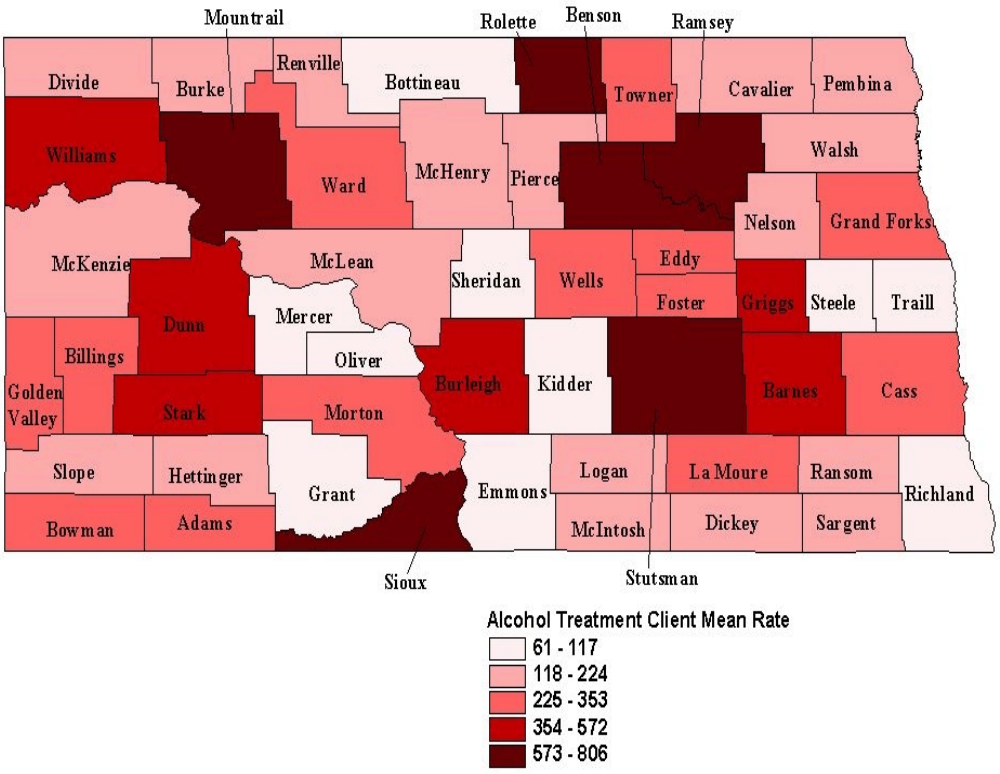


Source: Uniform Facilities Data Set (UFDS) / National Survey of Substance Abuse Treatment Services (N-SSATS)

Alcohol Treatment

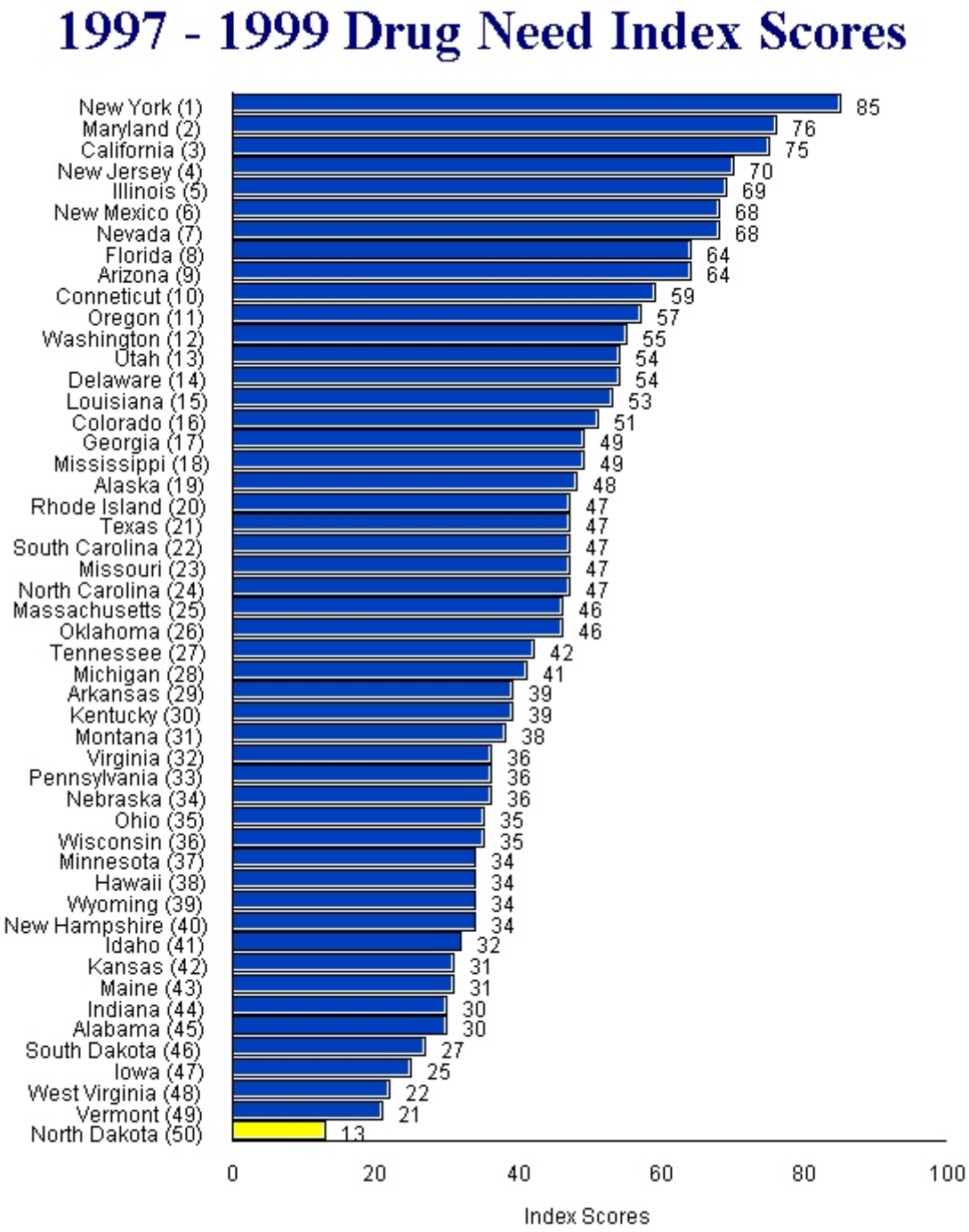


Alcohol Treatment Client Mean Rate, 1991 -2001

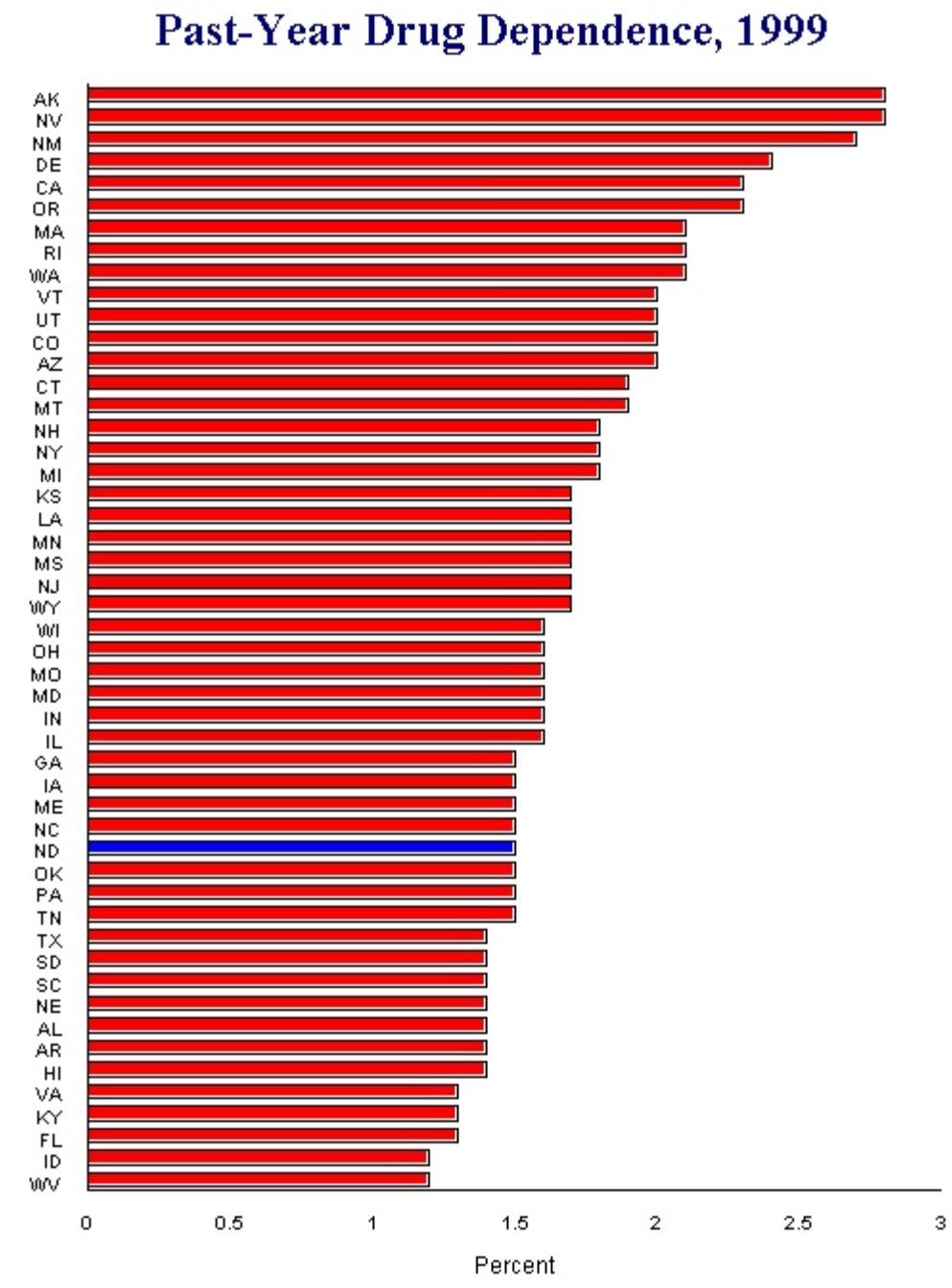


CONTROLLED DRUG INDICATORS

Drug Problems Compared to Other States

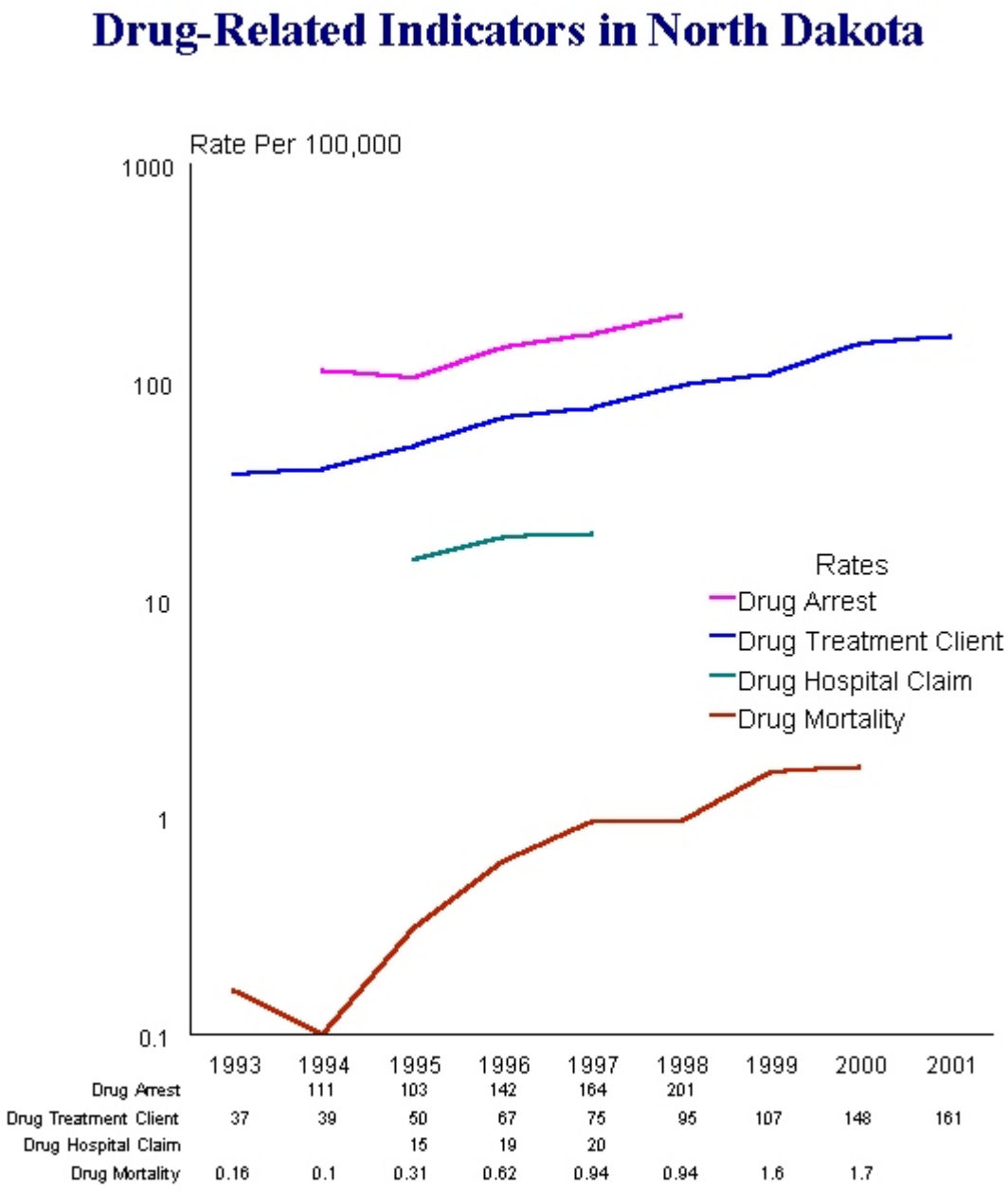


Drug Problems Compared to Other States

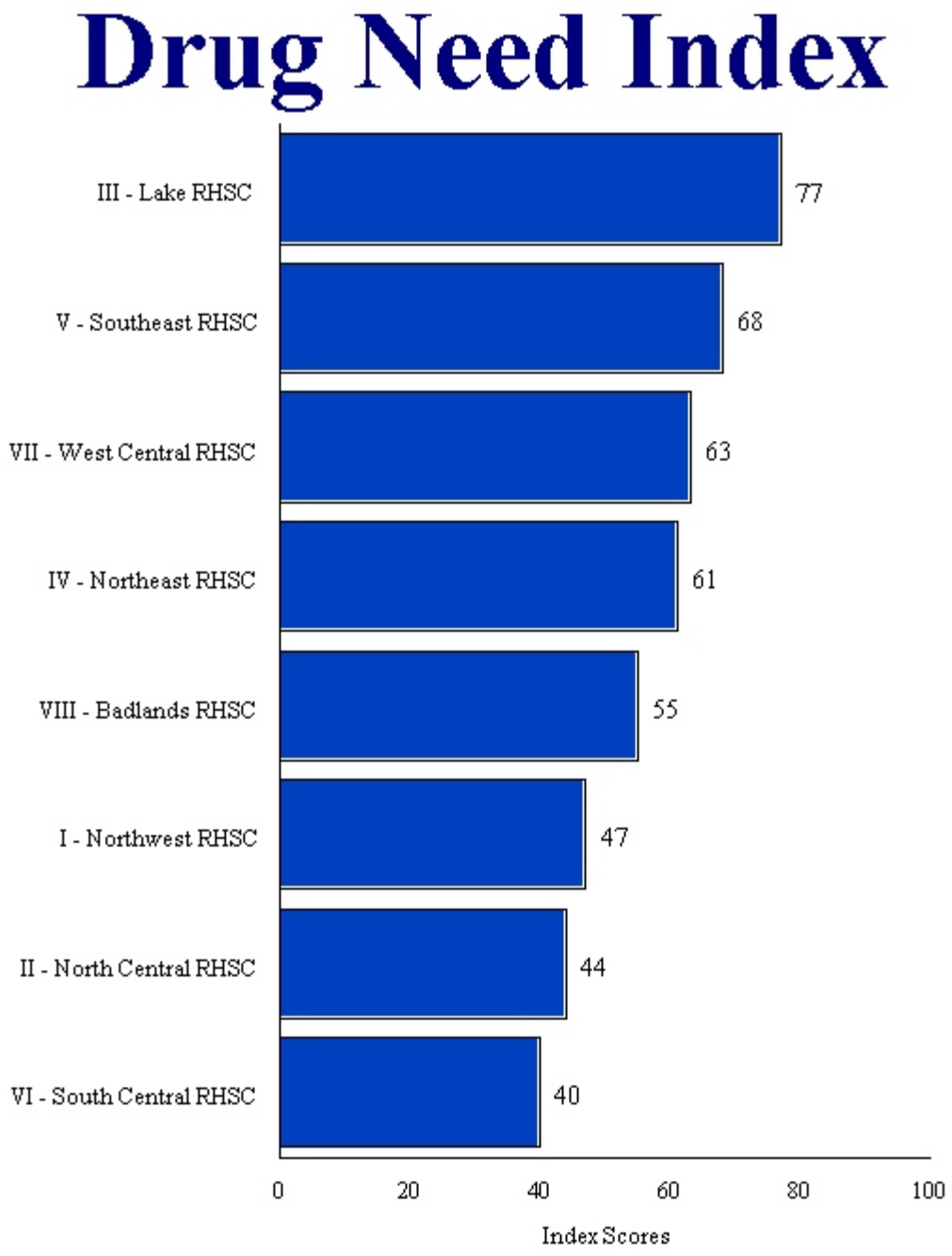


Source: National Household Survey on Drug Abuse (2000)

Drug Indicators in North Dakota

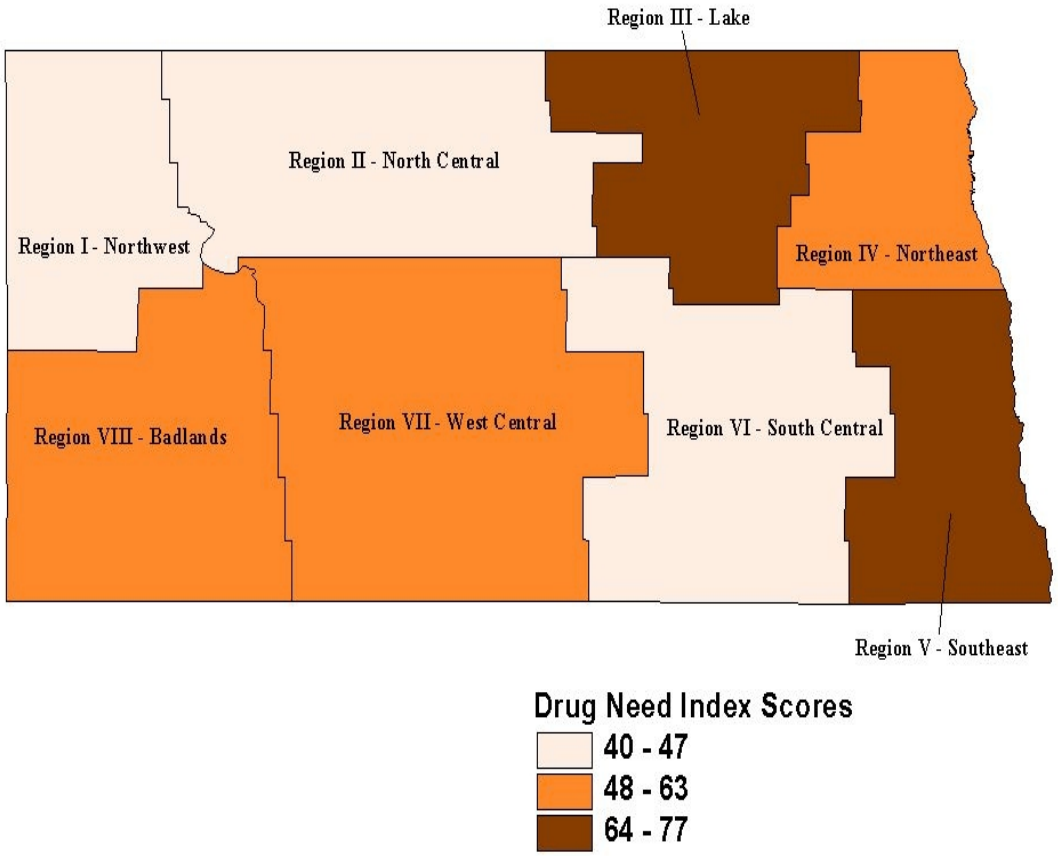


Drug Treatment Need Index

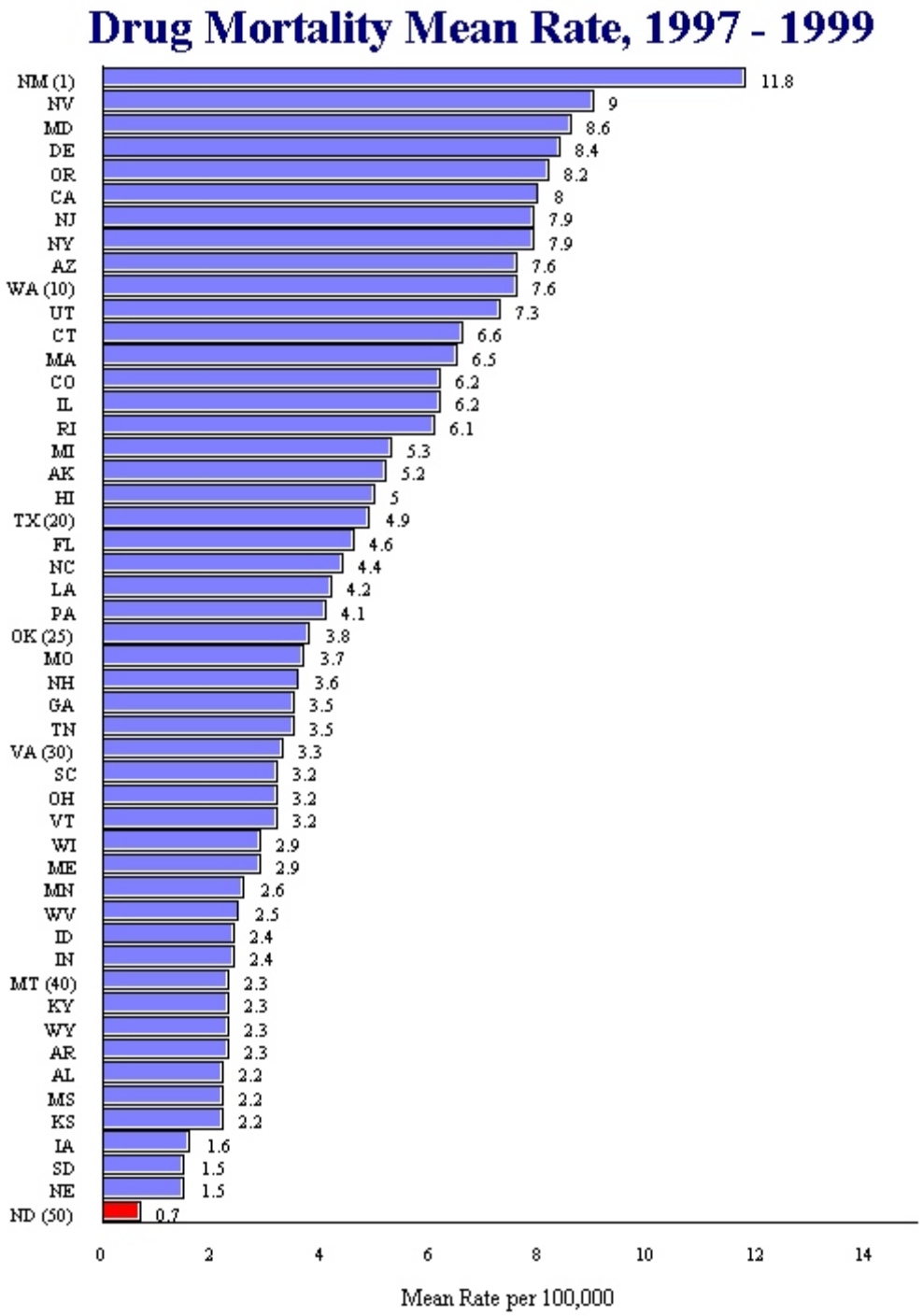


Drug Treatment Need Index

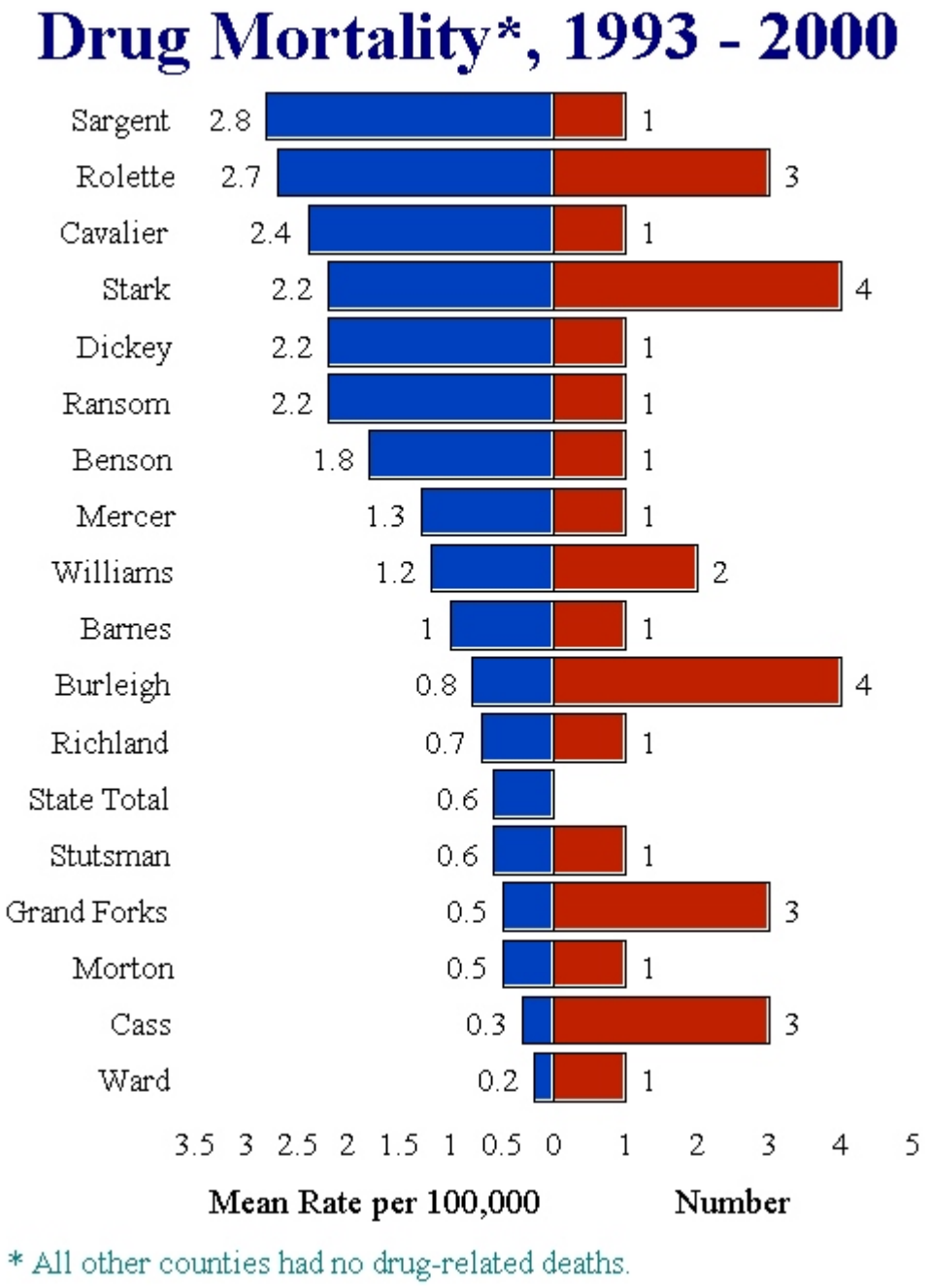
Drug Need Index



Drug Mortality

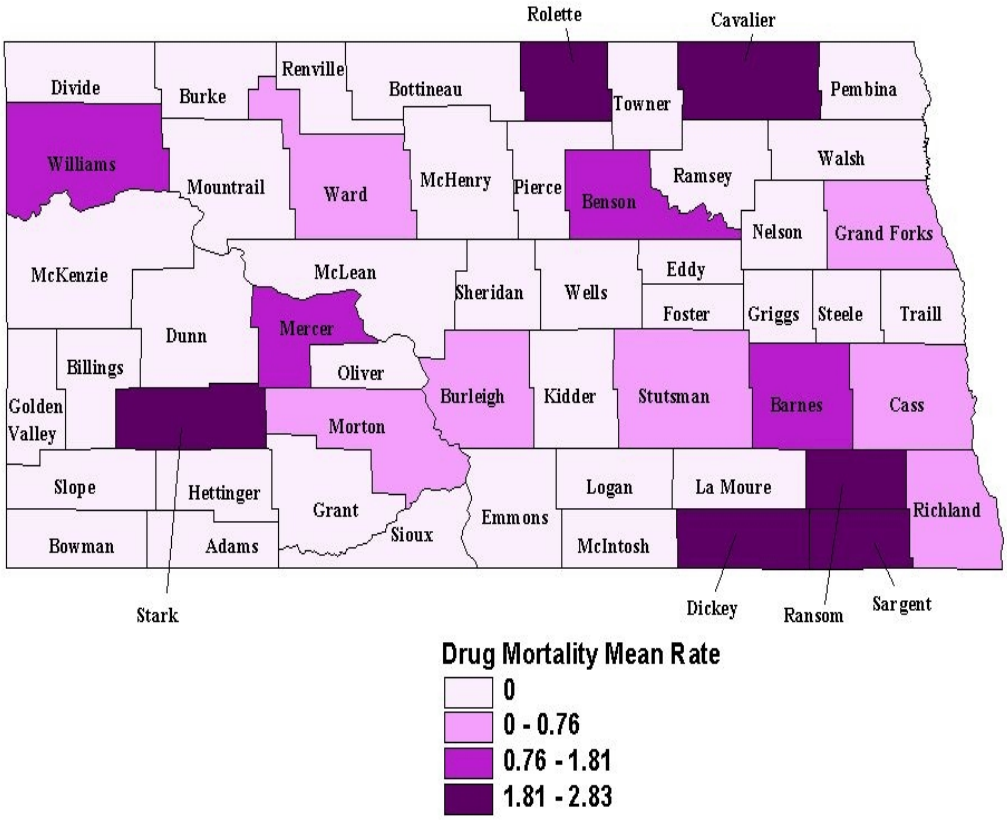


Drug Mortality

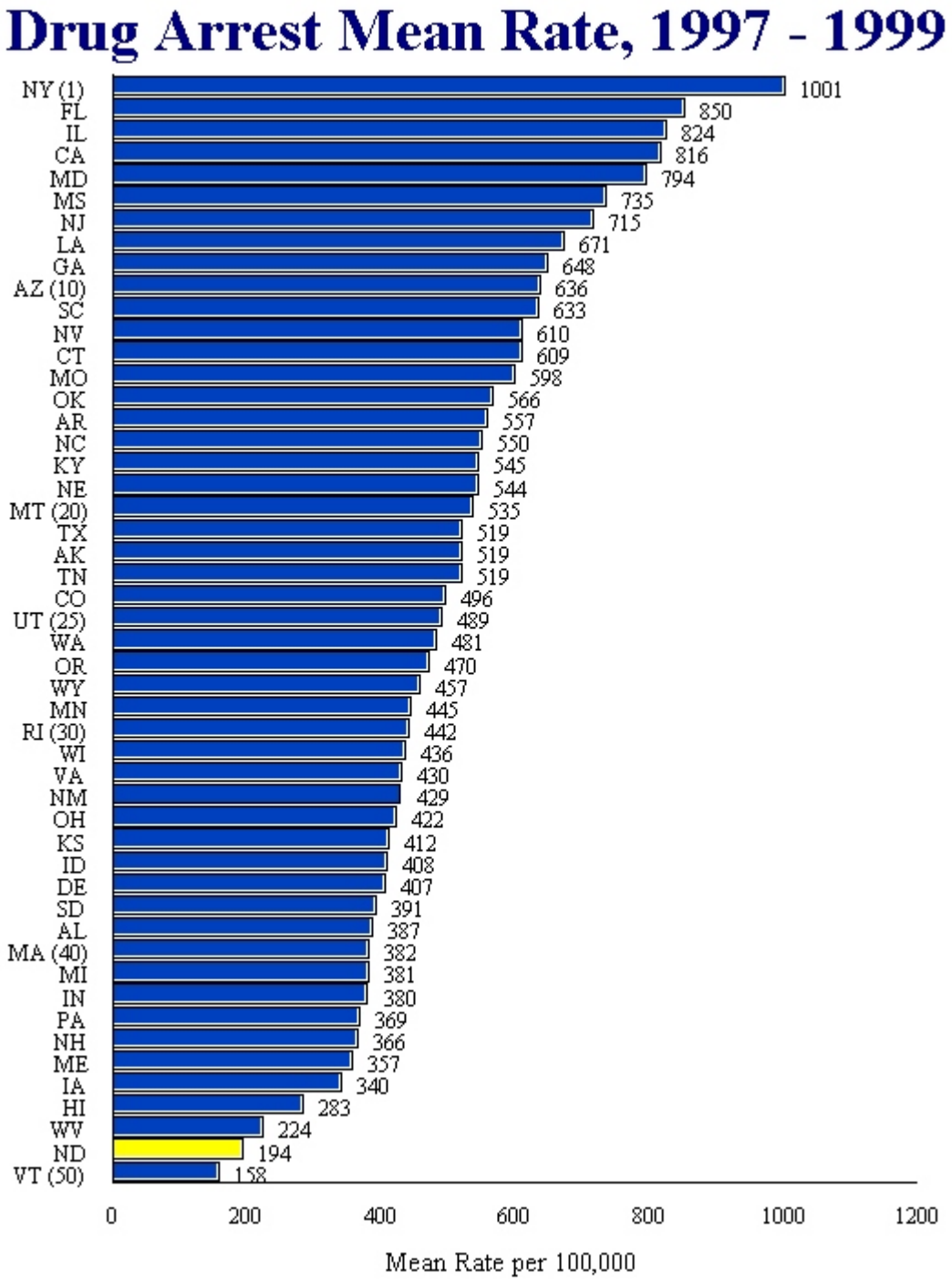


* All other counties had no drug-related deaths.

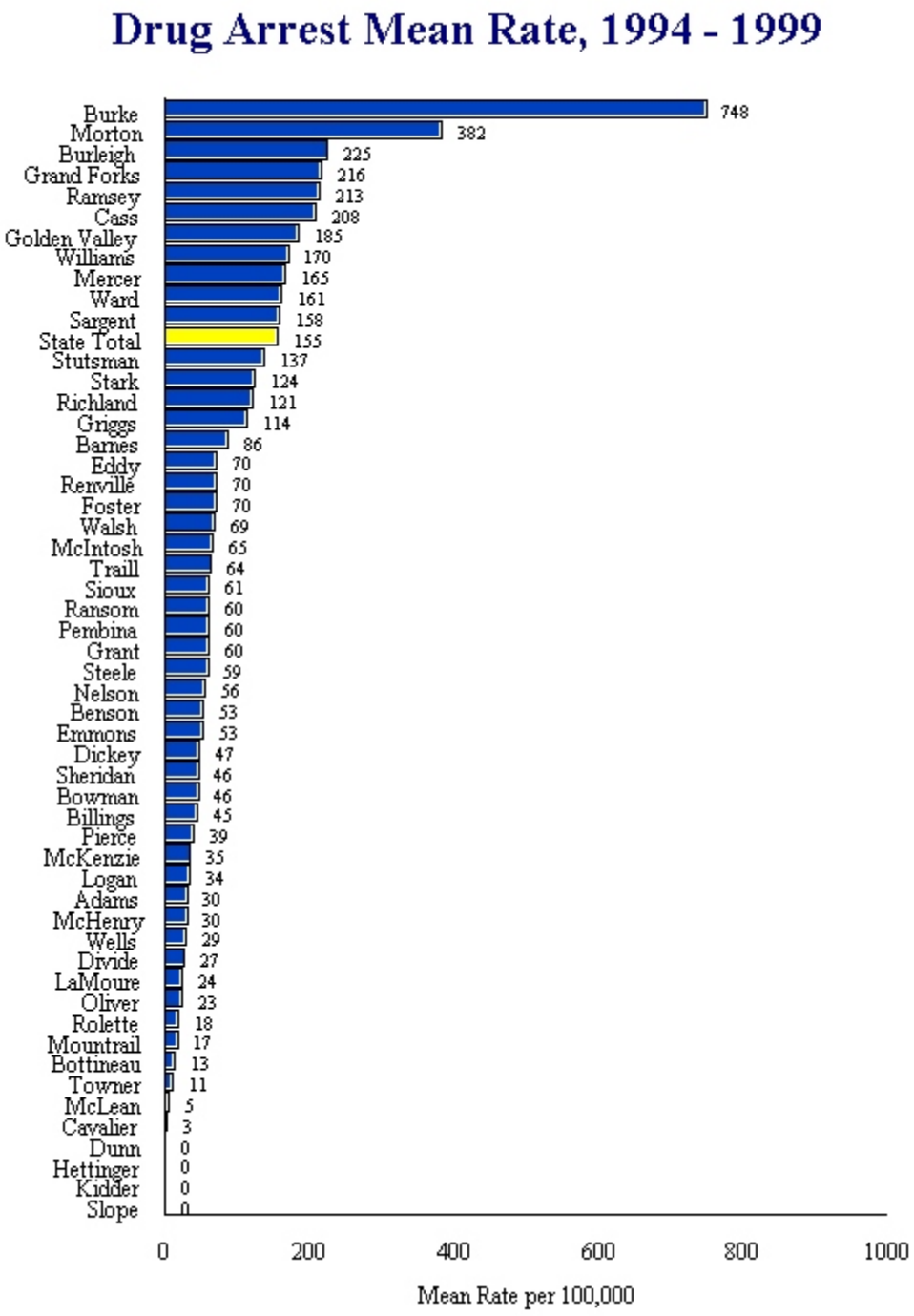
Drug Mortality Mean Rate, 1993 -2000



Drug Arrests: Sales and Possession

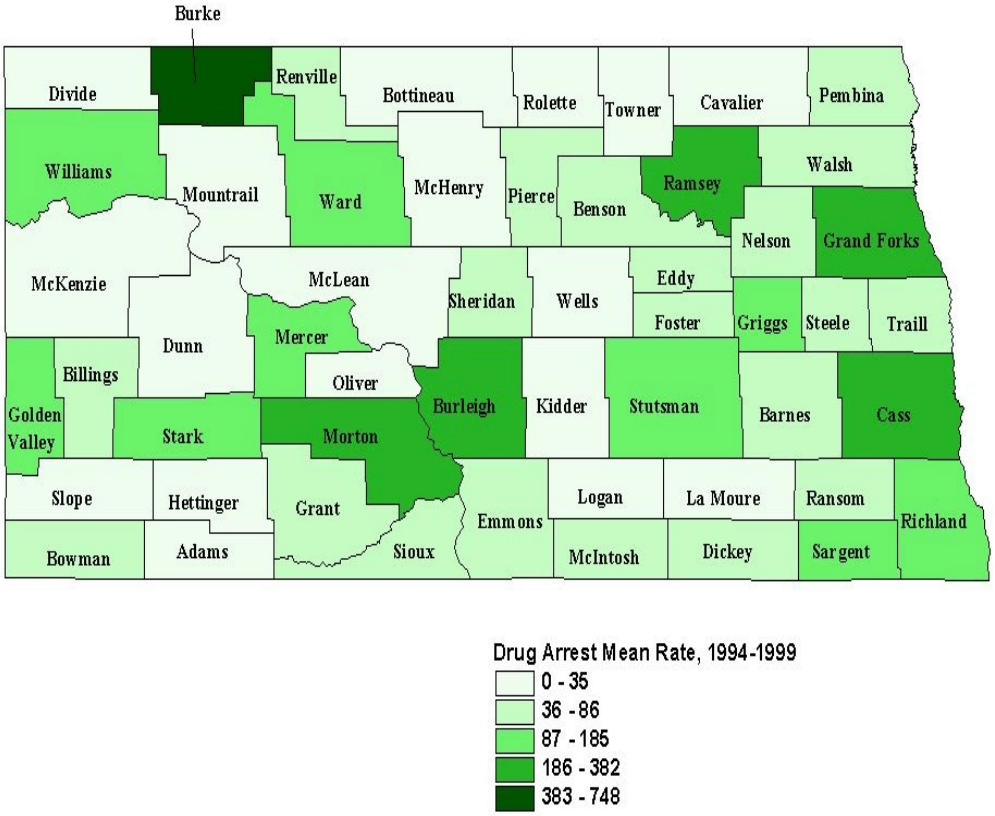


Drug Arrests: Sales and Possession

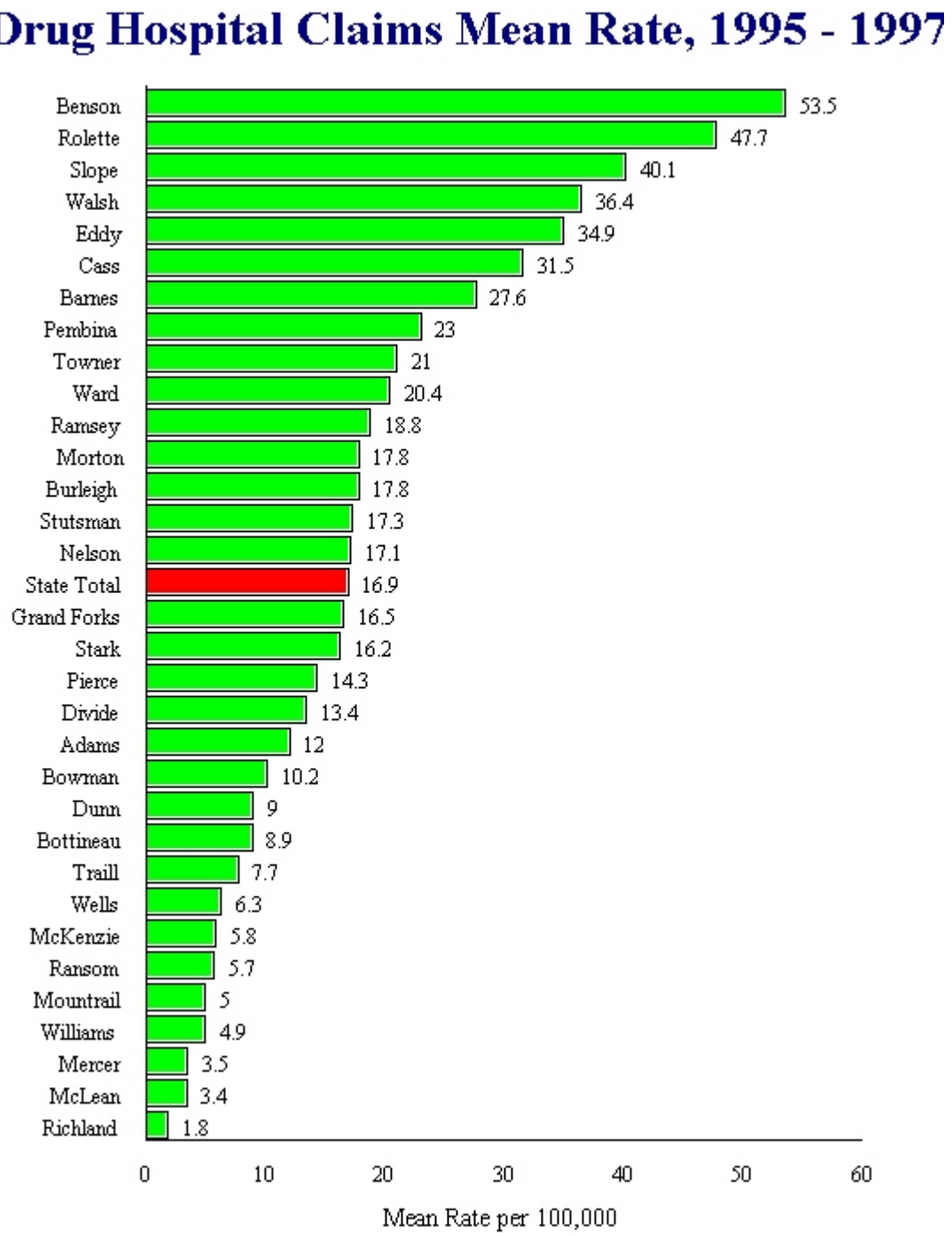


Drug Arrests: Sales and Possession

Drug Arrest Mean Rate, 1994 - 1999

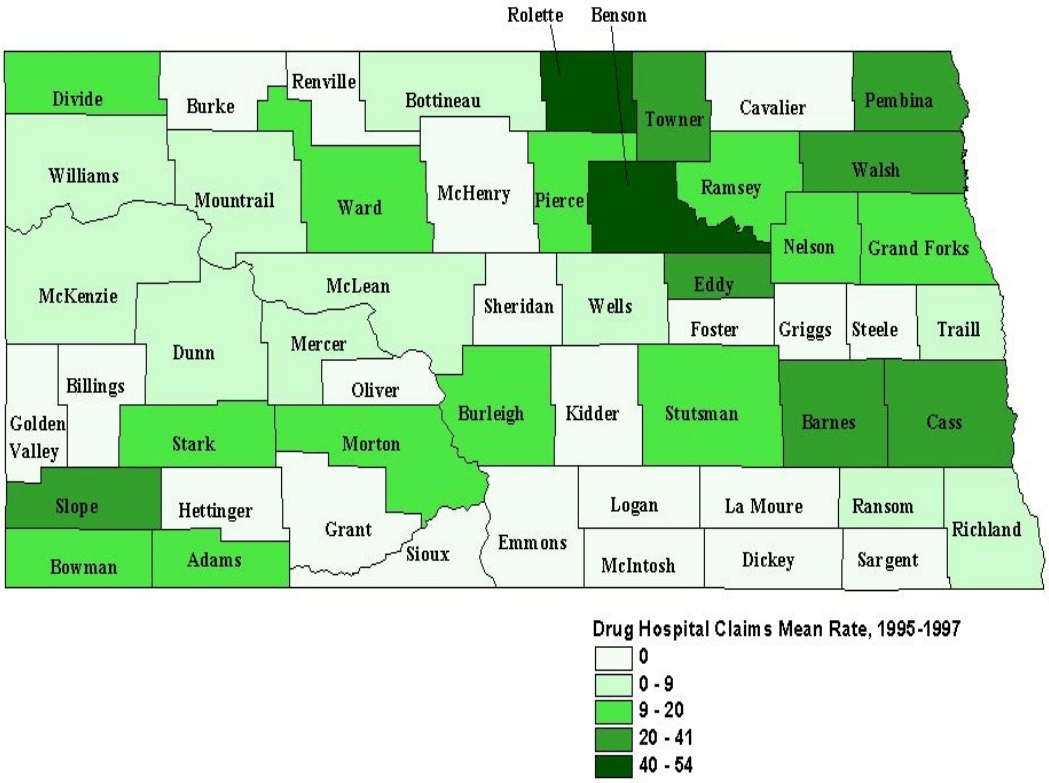


Drug Hospital Claims

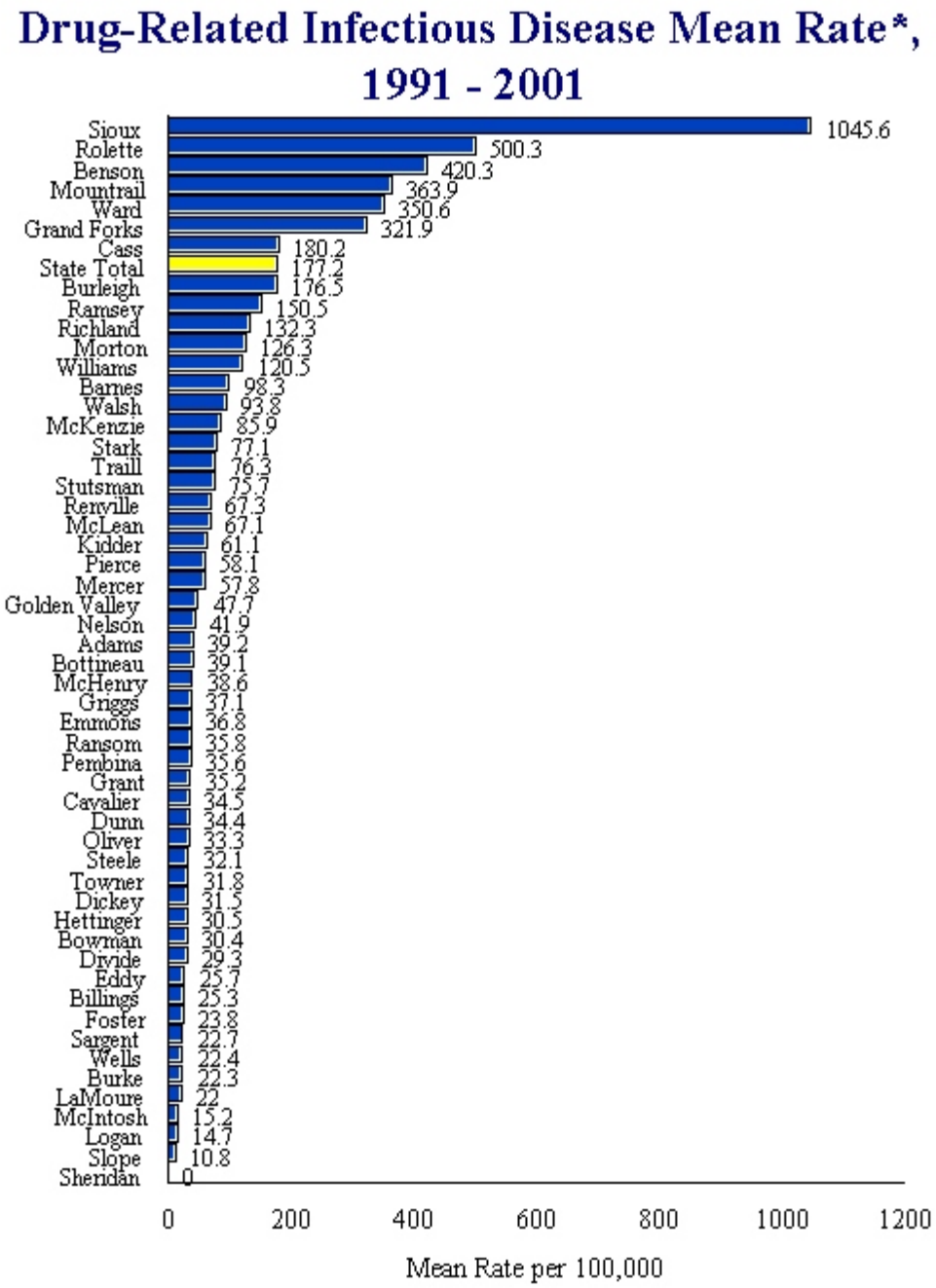


Drug Hospital Claims

Drug Hospital Claims Mean Rate, 1995 - 1997

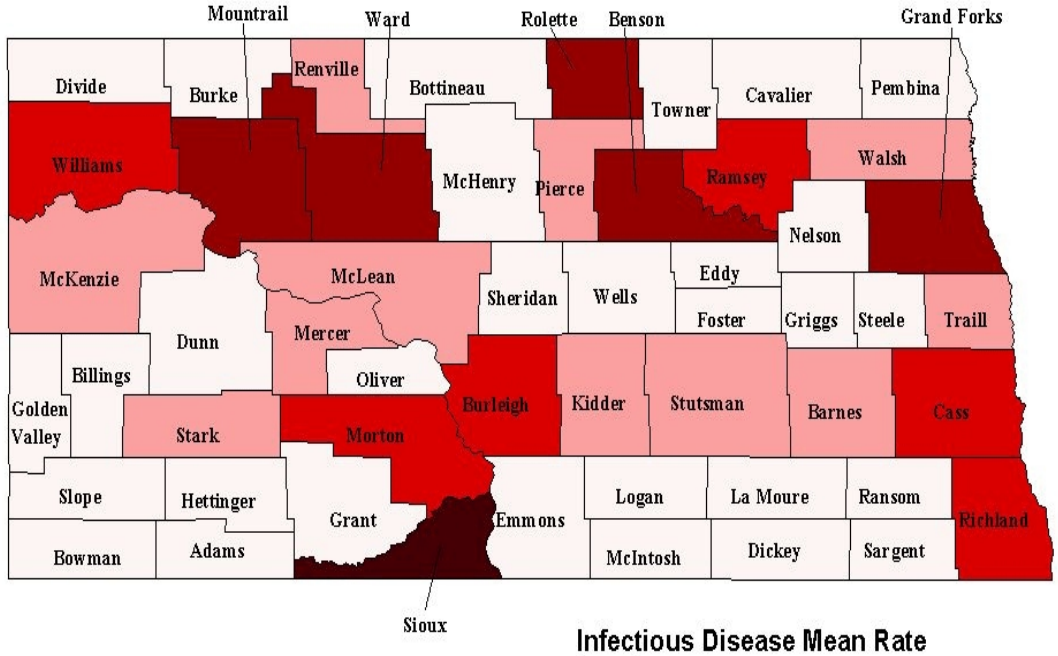


Drug-Related Diseases



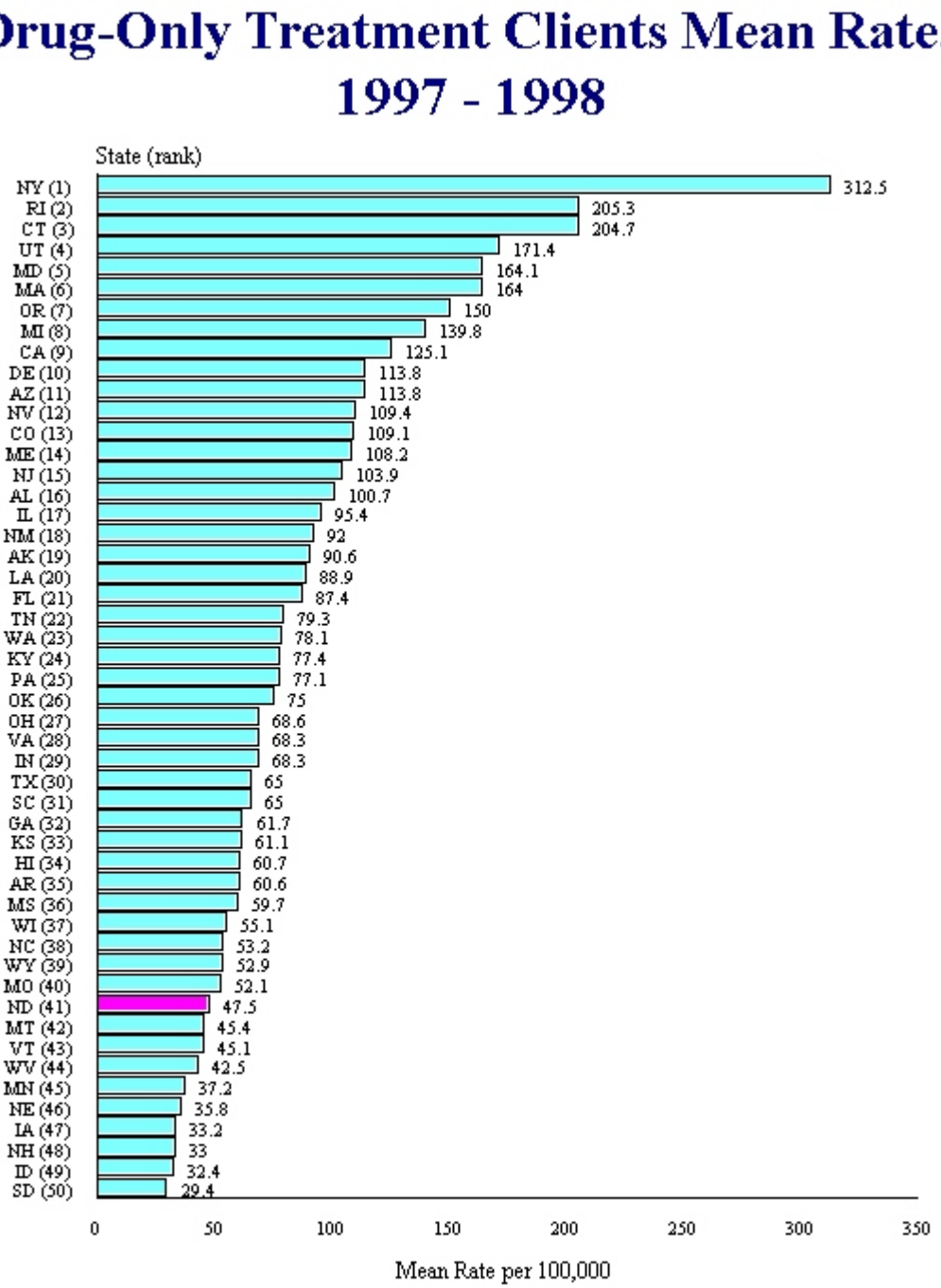
* Includes chlamydia, gonorrhea, early syphilis, acute hepatitis B, acute hepatitis C, and tuberculosis. Source: State Department of Public Health

Drug-Related Infectious Disease Mean Rate*, 1991 -2001



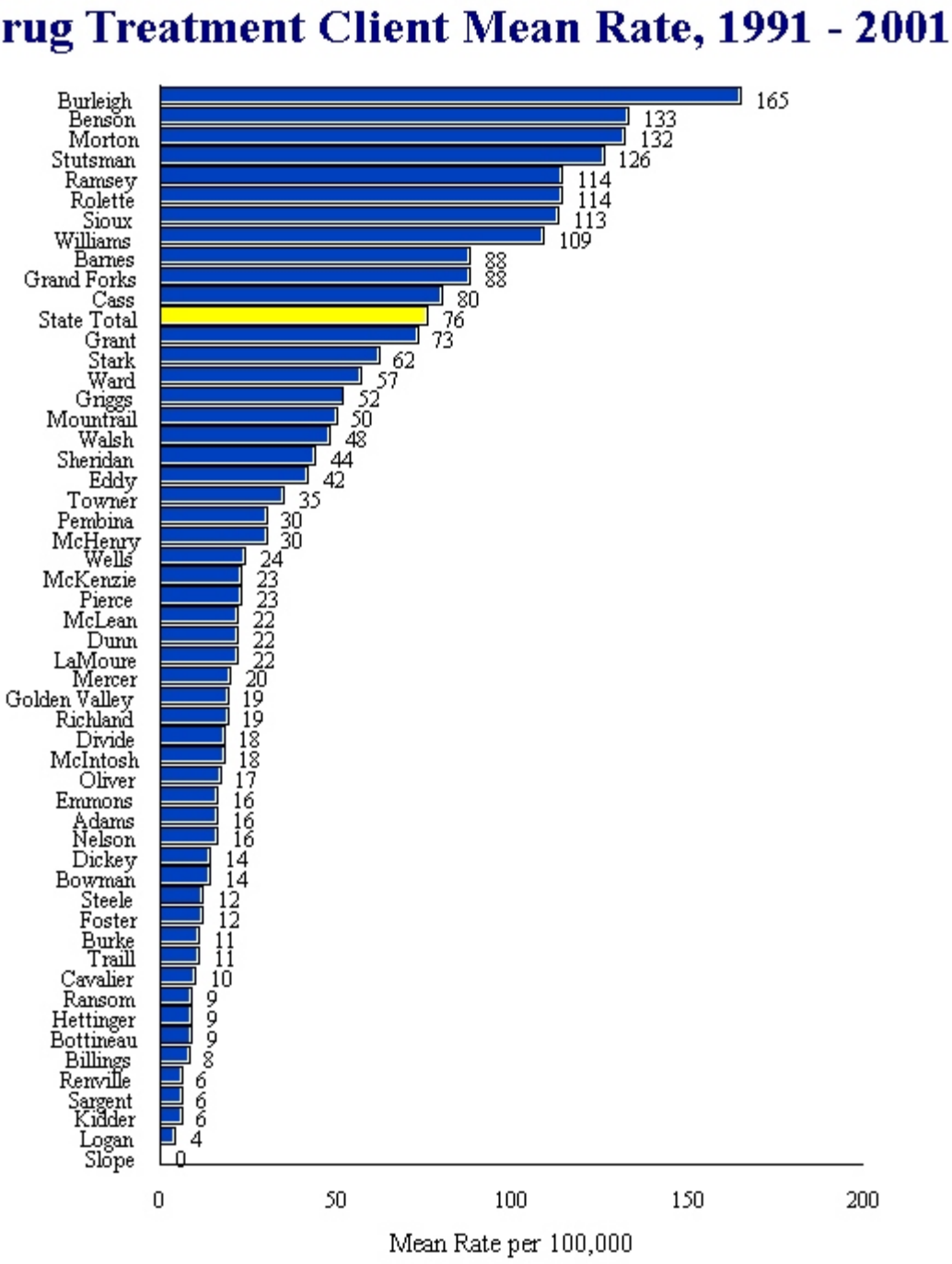
* Total of acute hepatitis B, acute hepatitis C, tuberculosis, early syphilis, gonorrhea, and chlamydia.

Drug Treatment

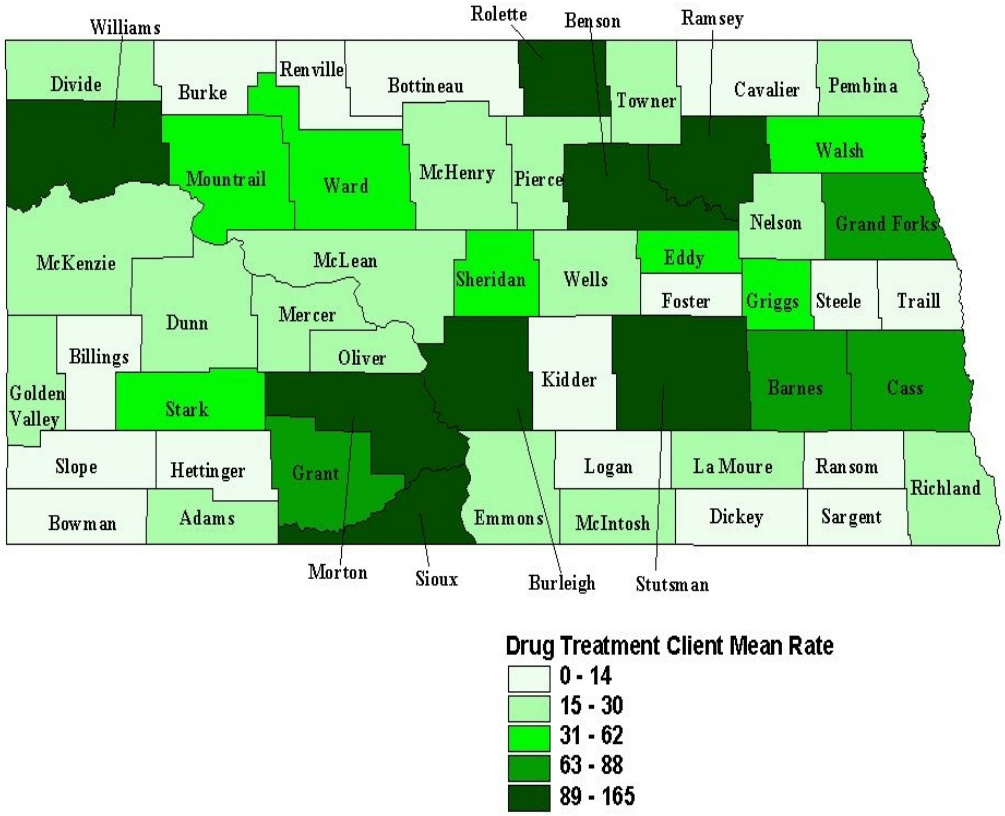


Source: Uniform Facilities Data Set (UFDS) / National Survey of Substance Abuse Treatment Services (N-SSATS)

Drug Treatment

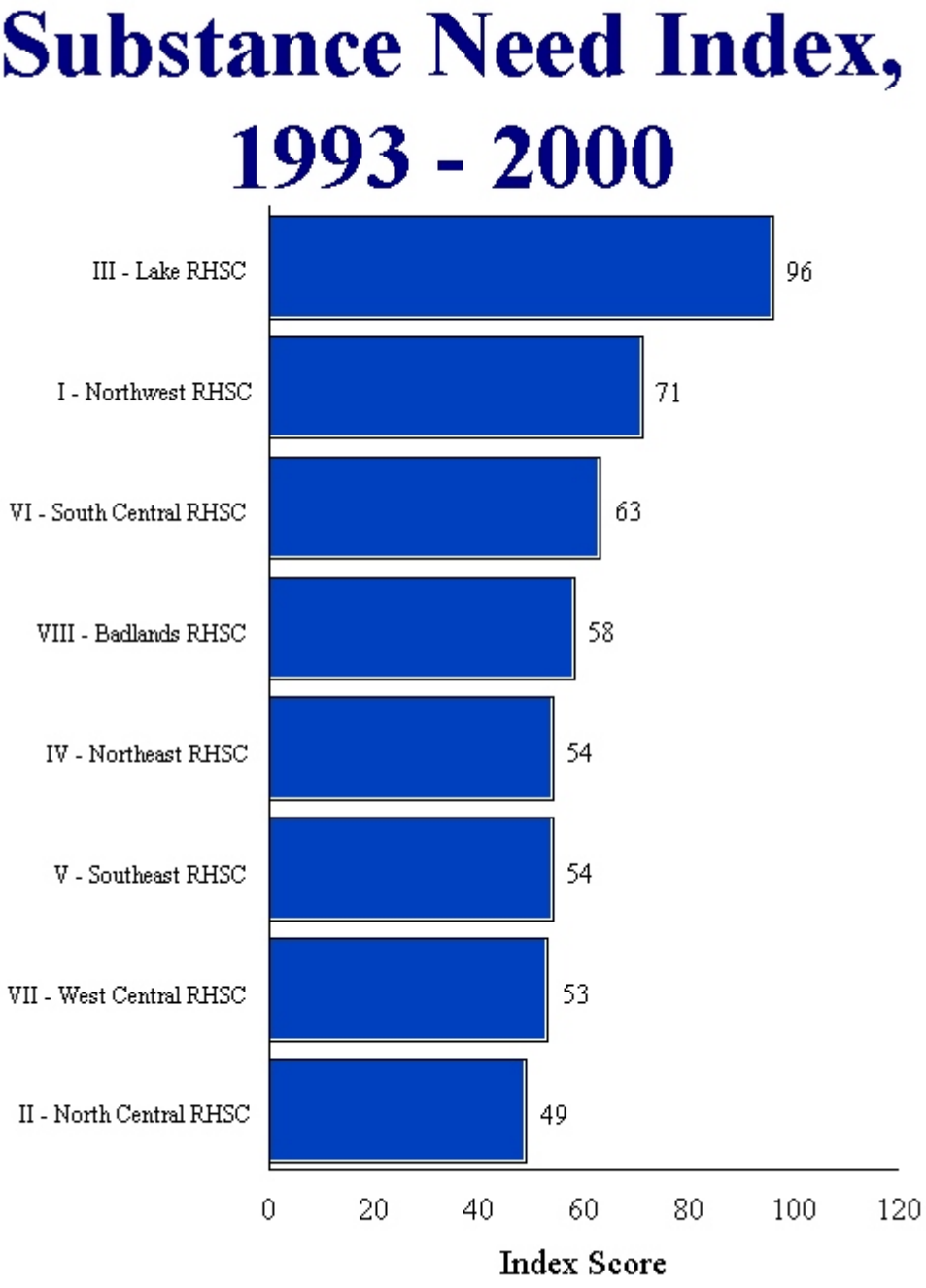


Drug Treatment Client Mean Rate, 1991 - 2001



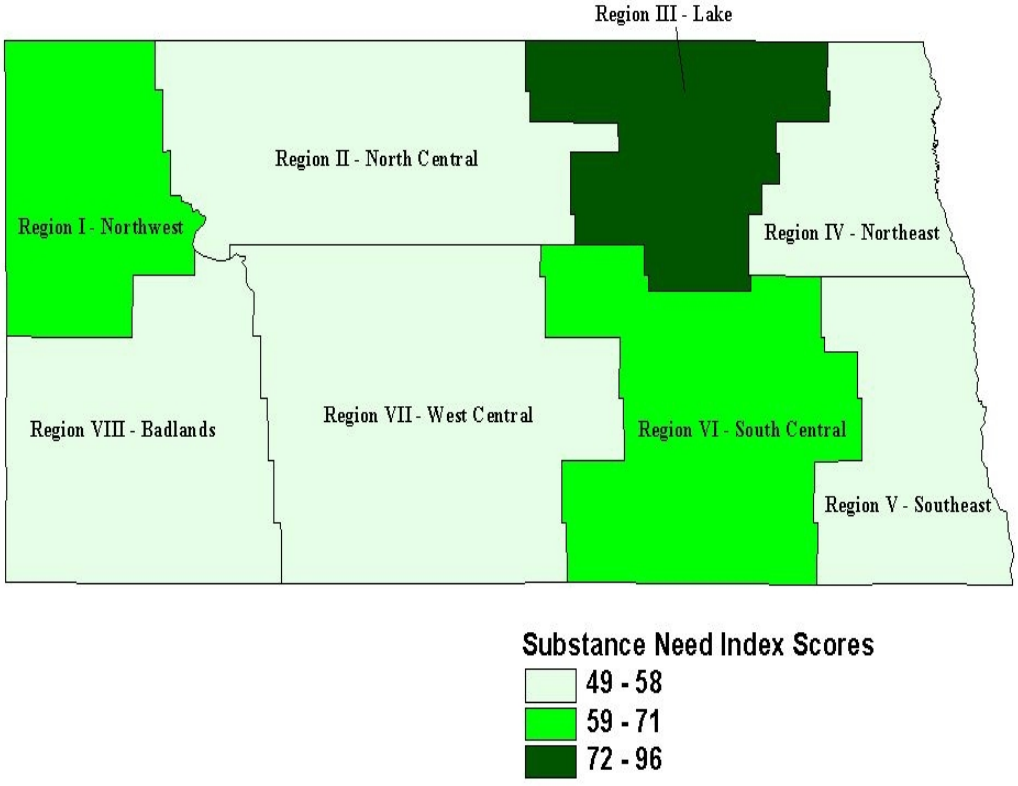
SUBSTANCE ABUSE INDICATORS

Substance Treatment Need Index



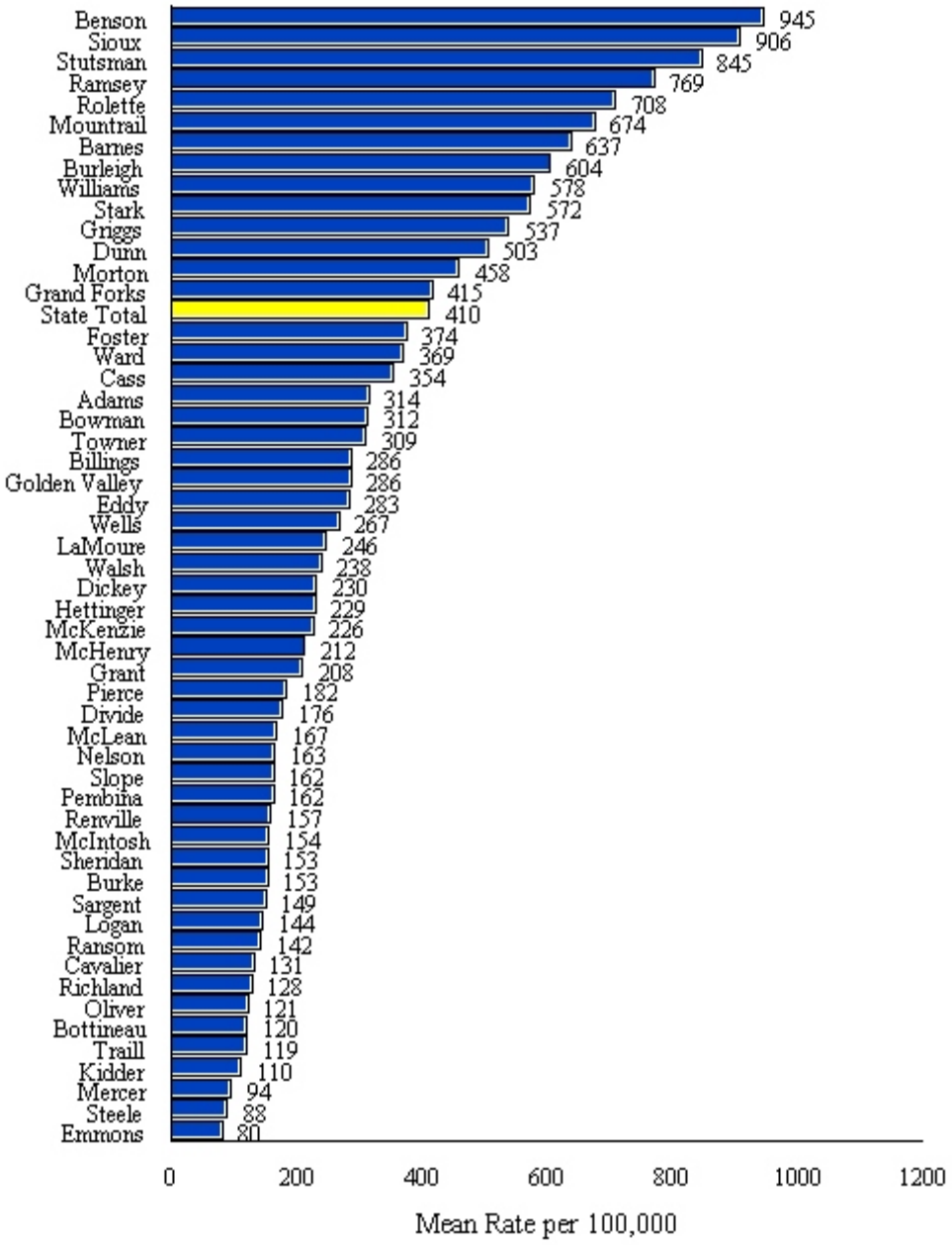
Substance Treatment Need Index

Substance Need Index, 1993 -2001

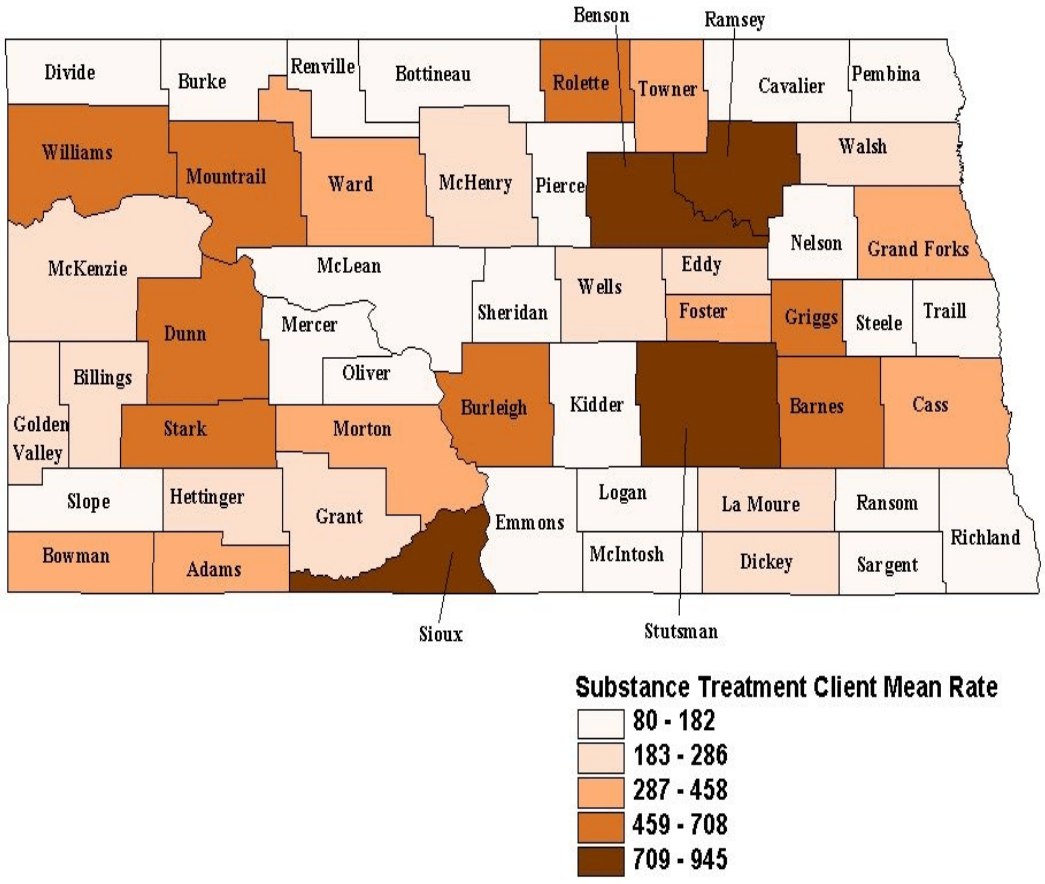


Substance Abuse Treatment

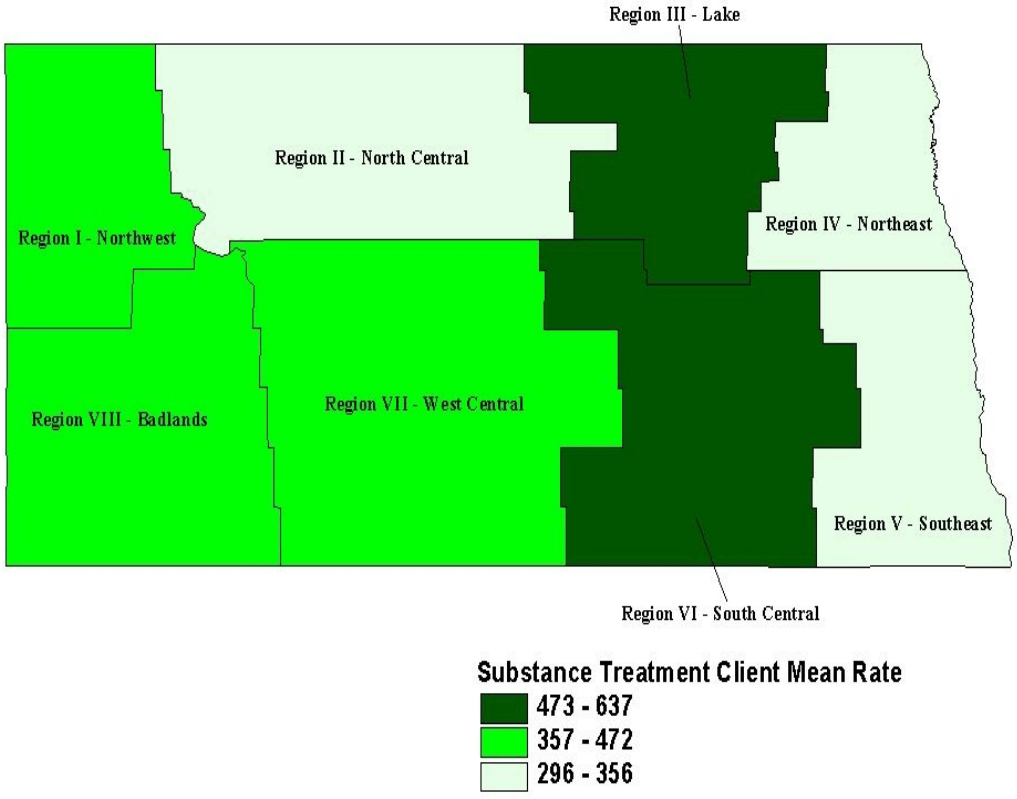
Substance Abuse Treatment Client Mean Rate, 1991 - 2001



Substance Abuse Treatment Client Mean Rate, 1991 -2001

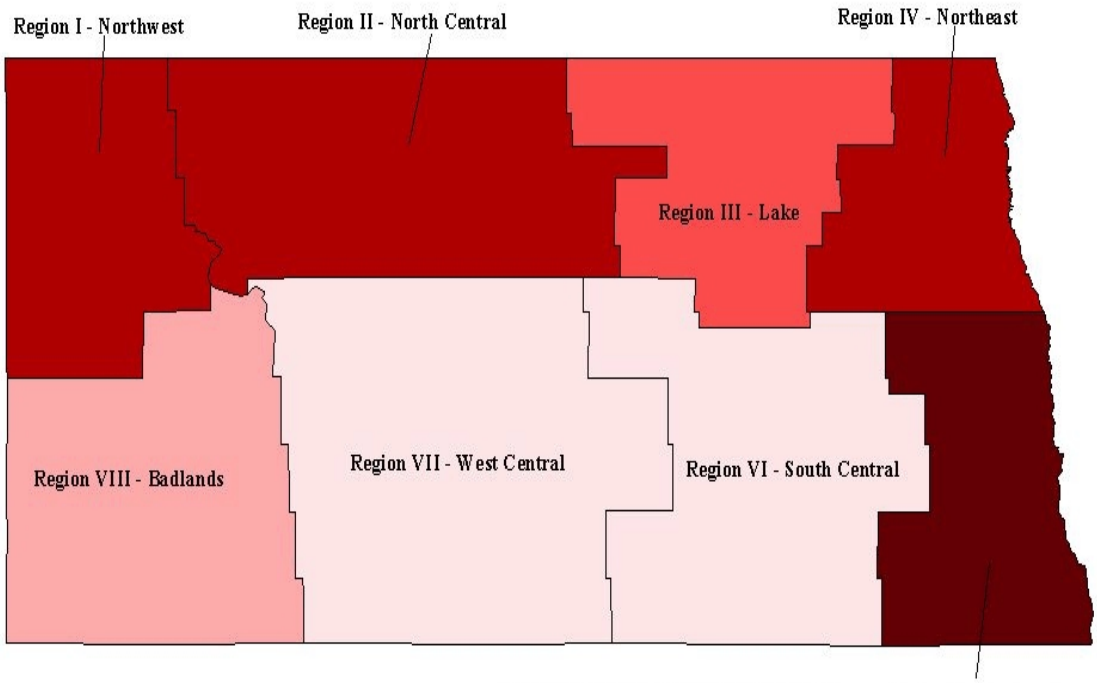


Substance Abuse Treatment Client Mean Rate, 1991 - 2001



Gap Analysis: Treatment Allocation Relative to Need

Residuals from Regression of Treatment on Substance Treatment Need



* The regression model used the substance abuse treatment client mean rate as the dependent variable and the substance need index scores as the independent variable to yield these residuals. A negative residual indicates fewer substance abuse treatment clients than predicted by the need index scores.

Residuals from Regression

- -98
- -97 to -25
- -24 to 0
- 1 to 47
- 48 to 90

North Dakota – Characteristics and Reliability of Alcohol and Controlled Drug Need Indicators and Treatment Admissions

Rates per 100,000		Min	Max	Median	Mean	Reliability*
Drug Indicators and Treatment						
Explicit-Mention Drug Mortality, 93-00	County	.00	2.8	.00	0.44	.04
	Regional	.14	1.4	0.60	0.72	.31
Drug-defined Arrests, 94-99	County	.00	748.5	59.0	90.7	.91
	Regional	78.9	207.3	132.8	135.2	.83
Drug Hospital Claims 95-97	County	.00	53.5	5.7	36.2	.46
	Regional	5.8	32.2	14.2	16.9	.81
Drug Treatment Clients, 91-01	County	.00	164.7	22.1	41.9	.91
	Regional	42.2	120.0	71.9	74.1	.93
Alcohol Indicators and Treatment						
Explicit-Mention Alcohol Mortality, 93-00	County	0.0	80.0	14.8	17.1	.82
	Regional	12.8	27.7	14.8	16.7	.80
Alcohol-defined Arrest, 94-99 (Liq, Law, and Disorderly Conduct)	County	.00	4,557.2	468.5	686.6	.97
	Regional	811.0	1,521.9	968.6	1,072.0	.90
Alcohol Hospital Claims 95-97	County	.00	617.7	70.1	96.1	.89
	Regional	65.9	296.8	95.6	126.6	.98
Alcohol Treatment Clients, 91-01	County	61.4	806.3	215.5	279.6	.94
	Regional	251.6	541.5	377.9	380.2	.94

* As measured by Cronbach's Alpha, which ranges from .00 (no reliability) to 1.00 (perfect reliability). Note: the mean and standard deviations are unweighted for county size. The sample sizes were 53 counties and eight regions.